



University of Engineering & Management

**Department of Computer Applications
(CA)**

BCA Syllabus

Academic Session: 2021-2024

Objective:

The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software. It helps students analyze the requirements for system development and exposes students to business software and information systems. This course provides students with options to specialize in legacy application software, system software or mobile applications.

Eligibility:

To be eligible for UG admissions, the applicants must have passed/appeared/ be due-to-appear in class 12th (Higher Secondary Examination). The eligibility qualification must be obtained from WBCHE (West Bengal Council of Higher Secondary Education) or its equivalent exam. Mathematics or Information Technology (IT) must be one of the subjects during class 12.

Program Educational Objectives (PEO)

PEO No.	PEO Description
PEO1	Technical Expertise: Develop the ability to plan, analyze, design, code, implement, test and maintain the software product for real time systems that are technically sound, economically feasible and socially acceptable.
PEO2	Successful Career: Exhibit professionalism, ethical attitude with updated technologies in Computer Application based career and capability to set up their own enterprise in various sectors of Computer Applications.
PEO3	Soft Skills: Develop communication skills, team work and leadership quality in their professional, multidisciplinary projects and adapt to current trends by engaging in lifelong learning.
PEO4	Continuous Learning: Prepare the students to pursue higher studies by acquiring knowledge in mathematical, computing and engineering principles in the field of computing and related fields and to work in the fields of teaching and research.

Program Outcome (PO)

PO No.	PO Description
PO1	Application of Knowledge: Ability to apply knowledge of computing, mathematics, science, humanities and engineering fundamentals for solution of Computer Application problems.
PO2	Problem Analysis: Ability to analyze a problem, then identify and formulate the computing requirements appropriate to its solution.
PO3	Development of Solutions: Ability to design, implement and evaluate a Computer based problems with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
PO4	Conduct Investigations of Complex Problem: Ability to design and conduct experiments, as well as to analyze and interpret data to reach valid conclusions.
PO5	Modern Tool Usage: Ability to create, select and apply appropriate techniques, skills, and modern tools necessary for computing practice.
PO6	Impact on Society: An ability to analyze the local and global impact of computing on individuals, organizations, and society.

PO7	Environment and Sustainability: Ability to understand the impact of the proposed solutions in societal and environmental contexts, and demonstrate the need for sustainable development.
PO8	Ethics: Ability to apply ethical principles and commit to professional ethics and responsibilities and norms while proposing solution for various Computer Application problems.
PO9	Individual and Team Work: Ability to function effectively individually and on teams, including diverse and multidisciplinary environment to accomplish a common goal.
PO10	Communication: Ability to communicate effectively on complex computational problems with the business community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project Management and Finance: Ability to demonstrate knowledge and understanding of the technical and management principles and apply these to one's work, as a member and leader in a team, to manage projects in multidisciplinary environments.
PO12	Continuous Learning: Ability to engage in professional development through continuous learning in the context of rapid technological changes happening globally.

L T P - Indicates Theory Lectures (L), Tutorial(T) and Practical (P) classes per week.

Semester I							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC1	BCA101 BCA191	Digital Electronics Digital Electronics Laboratory	4	0	3	7
2	CC2	BCA103 BCA192	Introduction to Programming Programming Laboratory-I	4	0	3	7
3	GE-1		Any one from GE basket.	4 / 5	0 / 1	4 / 0	4
Non-Credit Industry Value Added Course							
4	NIVAC1	BCA(GS)101	Essential Studies For Professionals - I	1	0	0	2
5	NIVAC2	BCA(GS)181	Skill Development For Professionals - I	1	0	0	1
6	AECC1	BCA181	Seminar – I				2
7	AECC2	BCA182	PC Software				2
8	AECC3	BCA183	Environment Studies				2
9	NIVAC3	MC181	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				28

Semester II							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC3	BCA201 BCA291	Computer Architecture Computer Architecture Laboratory	4	0	4	6
2	CC4	BCA203	Discrete Structure	5	1	0	6
3	AECC-2	BCA204	Soft Skills	2	0	0	2
4	GE-2		Any one from GE basket.	4 / 5	0 / 1	4 / 0	6
Non-Credit Industry Value Added Course							
5	NIVAC4	BCA(GS)201	Essential Studies For Professionals - II	1	0	0	2
6	NIVAC5	BCA(GS)281	Skill Development For Professionals - II	1	0	0	1
7	NIVAC6	MC281	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				24

Semester III							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC5	BCA301 BCA391	Data Structure with C Data Structure Lab with C	4	0	4	6
2	CC6	BCA302 BCA392	Object Oriented Programming with C++ Programming Lab with C++	4	0	4	6
3	CC7	BCA303	Operating System	5	1	0	6
4	SEC-1	BCAS301	Accounting	2	0	0	2
5	GE-3		Any one from GE basket.	4 / 5	0 / 1	4 / 0	6
Non-Credit Industry Value Added Course							
6	NIVAC7	BCA(GS)301	Essential Studies For Professionals - III	1	0	0	2
7	NIVAC8	BCA(GS)381	Skill Development For Professionals - III	1	0	0	1
8	NIVAC9	MC381	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				30

Semester IV							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC8	BCA401 BCA491	Database Management Systems Database Management Systems Lab	4	0	4	6
2	CC9	BCA402	Computer Networking	5	1	0	6
3	CC10	BCA403 BCA493	Programming with Java Programming Lab with Java	4	0	4	6
4	SEC-2	BCAS401	Web Design and Development	2	0	0	2
5	GE-4		Any one from GE basket.	4 / 5	0 / 1	4 / 0	6
Non-Credit Industry Value Added Course							
6	NIVAC10	BCA(GS)401	Essential Studies For Professionals - IV	1	0	0	2
7	NIVAC11	BCA(GS)481	Skill Development For Professionals - IV	1	0	0	1
8	NIVAC12	BCAN-481	Business Communication	2	0	0	1
9	NIVAC13	MC481	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				31

Semester V							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC11	BCA501 BCA591	Unix and Shell programming Unix and Shell programming Lab	4	0	4	6
2	CC12	BCA502	Software Engineering	5	1	0	6
3	DSE-1	BCAD501	A. Cyber Security B. Design & Analysis of Algorithm C. Information & Coding Theory D. Theory of Computation E. Combinatorial Optimization	4 / 5	0 / 1	4 / 0	6
4	DSE-2	BCAD581	Industrial Training & Minor Project	4	0	4	6
Non-Credit Industry Value Added Course							
5	NIVAC14	BCA(GS)501	Essential Studies For Professionals - V	1	0	0	2
6	NIVAC15	BCA(GS)581	Skill Development For Professionals - V	1	0	0	1
7	NIVAC16	BCAN-581	Numerical and statistical Methods	2	0	0	1
8	NIVAC17	BCAN-582	Industrial Training	1	0	0	1
9	NIVAC18	MC581	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				30

Semester VI							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC13	BCA601	Soft Computing	5	1	0	6
2	CC14	BCA602	Cloud Computing	5	1	0	6
3	DSE-3	BCAD601	A. Internet of Things B. Digital Image Processing C. Information Security D. Advanced Database and PL/SQL E. GUI Programming with .NET	4 / 5	0 / 1	4 / 0	6
4	DSE-4	BCAD681	Major Project & Grand Viva	4	0	4	6
Non-Credit Industry Value Added Course							
5	NIVAC19	BCA(GS)601	Essential Studies For Professionals - VI	1	0	0	2
6	NIVAC20	BCA(GS)681	Skill Development For Professionals - VI	1	0	0	1
7	NIVAC21	BCAN-681	Automata & Natural Language Processing	2	0	0	1
8	NIVAC22	MC681	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				29

Semester	Credit
I	28
II	24
III	30
IV	31
V	30
VI	29
Total	172

Basket 1	GENERAL SCIENCE & MATHEMATICS	GE1B-01	Business Research Methods: Tool & Techniques
		GE1B-02	Business Mathematics
		GE1B-03	Mathematics for Computing
		GE1B-04	Operations Research
		GE1B-05	Inferential Statistics

Basket 2	OTHER COURSES	GE2B-01	Economics
		GE2B-02	Principles of Management & Organizational Behaviors
		GE2B-03	Decision Support System
		GE2B-04	Digital Marketing
		GE2B-05	Leadership Skill Development

Basket 3	HUMANITIES & HUMAN SKILLS	GE3B-01	Values & Ethics
		GE3B-02	Creative Writing
		GE3B-03	Leadership
		GE3B-04	Professional Communication
		GE3B-05	E-Learning

Basket 4	EMERGING TECH, INNOVATION & ENTREPRENEURS HIP	GE4B-01	Data Analysis with R
		GE4B-02	Guidance of Excel for office Assistance
		GE4B-03	Machine Learning with Python
		GE4B-04	Entrepreneurship Principles
		GE4B-05	E-Commerce & M-Commerce

L T P - Indicates Theory Lectures (L), Tutorial(T) and Practical (P) classes per week.

Semester I							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC1	BCA101 BCA191	Digital Electronics Digital Electronics Laboratory	4	0	4	7
2	CC2	BCA103 BCA192	Introduction to Programming Programming Laboratory-I	4	0	4	7
3	GE-1		Any one from GE basket.	4 / 5	0 / 1	4 / 0	4
Non-Credit Industry Value Added Course							
4	NIVAC1	BCA(GS)101	Essential Studies For Professionals - I	1	0	0	2
5	NIVAC2	BCA(GS)181	Skill Development For Professionals - I	1	0	0	1
8	AECC1	BCA181	Seminar – I				2
9	AECC2	BCA182	PC Software				2
	AECC3	BCA183	Environment Studies				2
	NIVAC3	MC181	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				28

Name of the Course: BCA	
Subject: Digital Electronics	
Course Code: BCA101 and BCA 191	Semester: 1st
Duration: 40 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam:70
Tutorial: 0	Continuous Assessment: 30
Practical: 4	Practical Sessional internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	To gain skill to build and troubleshoot digital logic circuits
2.	To gain skill to use the methods of systematic reduction of Boolean expression using K-Map
3.	To be able to interpret logic gates and its operations
4.	Familiarization with semiconductor memories in electronics.
Objective:	
Sl. No.	
1.	To gain basic knowledge of digital electronics circuits and its levels.
2.	To understand and examine the structure of various number system and its conversation.
3.	To learn about the basic requirements for a design application
4.	To enable the students to understand, analyze and design various combinational and sequential circuits
5.	To understand the logic functions, circuits, truth table and Boolean algebra expression
Pre-Requisite:	
Sl. No.	None
Course Outcome:	
1.	Convert different type of codes, Boolean algebra and number systems which are used in digital communication and computer systems.
2.	Employ the codes and number systems converting circuits and compare different types of logic families which are the basic unit of different types of logic gates and arithmetic circuits in the domain of performance and efficiency.
3.	Analyze different types of combinational circuits and sequential circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
4.	Design different types of with and without memory element digital electronic circuits like

	Registers and Counters for particular operation.
--	--

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction to Number System and Codes Boolean algebra and Minimization Technique	Number System, Floating Point Representation Of Numbers, Arithmetic Operations, 1'S and 2'S Complements, 9'S Complement, 10'S Complement, Binary Coded Decimal (BCD), Codes Introduction, Development Boolean Algebra, Boolean logic operations, Basic Laws of Boolean Algebra, Demorgan's Theorem, Sum of Products and Product of Sums, Karnaugh Map	8	CO1
Module 2: Logic Gates Arithmetic Circuits	Logic Gates, Mixed Logic, Multilevel Gating Networks, Multiple Output Gate Networks Introduction, Procedure for the Design of Combinational Circuits, Half Adder, Full Adder, K-Map Simplification, Half Subtractor, Full Subtractor, Parallel Binary Adder, 4-bit Parallel Adder/Subtractor, Fast Adder, Serial Adder, 4-bit Serial Adder/Subtractor, BCD Adder	10	CO2
Module 3: Combinational Circuits Flip Flop	Introduction, Multiplexer (Data Selectors), Applications of Multiplexer, Demultiplexer (Data Distributors), Decoders, Liquid Crystal Display, Encoders, Parity Generators/ Checkers, Parity Generation, Code Converter Introduction, Latches, Flip flop, S-R Flip flop, D Flip flop, J-K Flip flop, T Flip flop, Triggering of Flip flop, Master Slave Flip flop, Realization of one Flip flop to another Flip flop, Application of Flip flop	12	CO3
Module 4: Counters Registers	Introduction, Asynchronous Counter, Ripple Counter with decoded output, Ripple Counter with modulus, Asynchronous down counter, Up Down Counter, Propagation delay in ripple counter, Synchronous Counter, Synchronous Counter with ripple carry, Synchronous Down Counter, Synchronous Up Down Counter, Asynchronous/Synchronous Counter, Design of Synchronous Counter Introduction, Shift Register, Universal Shift Register, Shift Register counter, Shift Counter	10	CO4
	Total:	40	

Practical: (Digital Electronics Lab)

Course Code: BCA 191

Credit: 2

Skills to be developed:

Intellectual skills:

1. Skill to analyze Boolean equation and to create the circuit.
2. Knowledge of advanced digital circuits.

List of Practical:

1. Design and verify the truth table of basic logic gates
2. (AND, OR, NOT)
3. Design and verify the truth table of Universal logic gates
4. (NAND, NOR)
5. Design and verify the truth table of XOR and XNOR gates
6. Design basic logic gates (AND, OR, NOT) using the NAND gate.
7. Design basic logic gates (AND, OR, NOT) using the NOR gate.
8. Design and verify the truth table of DeMorgans Law.
9. Design and verify the truth table of Principal of duality.
10. Design the circuit diagram and verify the truth table for half adder using XOR and AND gate.
11. Design the circuit diagram and verify the truth table for half adder using basic gates.
12. Design the circuit diagram and verify the truth table for full adder.
13. Implement full adder using two half adders.
14. Design the circuit diagram and verify the truth table for half subtractor using XOR and AND gate.
15. Design the circuit diagram and verify the truth table for full subtractor.
16. Design the circuit diagram for 4:1 Multiplexer.
17. Design the circuit diagram for 8:1 multiplexer using two 4:1 multiplexer.
18. Design the circuit diagram for 1:4 Demultiplexer.
19. Design the circuit diagram for 1:8 Demultiplexer.
20. Design the circuit diagram for BCD to Seven Segment Decoder.
21. Design the circuit diagram for Octal to binary encoder.
22. Design the circuit diagram for SR flip flop.

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
S Salivahanan , S Arivazhagan	Digital Circuits and Design,	4th edition	
Reference Books:			
M. Morris. Mano & Michael D. Ciletti	Digital Design		PEARSON
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1.	Breadboard, Power Supply, Wires		
2.	ICs		

CO & PO Mapping:

[illegible]

Name of the Course: BCA	
Subject: Introduction to Programming	
Course Code: BCA103 and BCA192	Semester: 1st
Duration: 40 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam:70
Tutorial: 0	Continuous Assessment: 30
Practical: 4	Practical Sessional internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	In-depth understanding of various concepts of programming language.
2.	Ability to read, understand and trace the execution of programs
3.	Skill to debug a program.
4.	Skill to write program code in C to solve real world problems.
Objective:	
Sl. No.	
1.	To introduce students to a powerful programming language
2.	To understand the basic structure of a program
3.	To gain knowledge of various programming errors.
4.	To enable the students to make flowchart and design an algorithm for a given problem.
5	To enable the students to develop logics and programs
Pre-Requisite:	
Sl. No.	
1.	Understanding of basic mathematical logic.
Course Outcome:	
1.	Students will be able to learn how to build by the algorithms for problems and basic understanding of programming language.
2.	Students will be able to learn how to create pictorial representations of the program and to develop an in-depth understanding of logical concepts of C Programming.
3.	Students will be able to learn how to implement different operations on functions, pointers, structures, unions and choose best way to solve problem.

4.	Students will be able to enhance their programming skills through implementing files concept and preprocessor..
----	---

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction	History of C, Importance of C, Sample Program, Basic Structure of C Program, Programming Style, Executing C program	8	CO1
Constants, variables, data types	Introduction, Character Set, C Tokens, Keywords and identifiers, Constants, Variables, Data types, Declaration of variables, Declaration of storage class, Assigning values to variables		
Operators and Expressions	Introduction, Arithmetic operators, Relational operators Logical operators Assignment operators Increment and decrement operators Conditional operators, Bitwise operators, Special operators, Arithmetic expression, Evaluating expression Precedence of arithmetic operators, Type conversions in expression Operator precedence and associativity		
Managing Input and Output operations	Introduction, Reading a Character, Writing a Character Formatted Input, Formatted Output		

Module 2: Decision making and branching Loop Arrays Character Arrays and Strings	<p>Introduction, Decision making with IF statement, IF..ELSE statement, Nesting of IF..ELSE statement, ELSE..IF ladder, Switch statement, The ? : operator, GOTO statement</p> <p>Introduction, The WHILE statement, The DO statement, The FOR statement, Jumps in LOOPS</p> <p>What are Arrays?, One dimensional Array Declaration, One dimensional array Initialization, Two dimensional array declaration, Two dimensional array initialization</p> <p>Introduction, Declaring and initializing string variables, Reading strings, Writing strings, Arithmetic operations on characters, Putting strings together, Comparison on two strings, String handling function</p>	12	CO2
Module 3: User-defined Functions Structures and Union Pointer	<p>Introduction, Need for user-defined function, A multi-function program, Elements of user-defined function ,Definition of functions, Return values and types, Function calls, Function declaration, Categories of function, Nesting of function, Recursion, Passing arrays to function, Passing strings to function, Scope, visibility and lifetime of variables</p> <p>Introduction, Defining structure, Declaring structure variables, Accessing structure members, Structure initialization, Copying and comparing structure variables, Operations on individual members Arrays of structures, Structure within structure, Structure and function, Union</p> <p>Understanding Pointers, Accessing address of a variable, Declaring pointer variable, Initialization of pointer variable, Accessing a variable through its pointer, Pointer expression, Pointer Increments and scale factor, Pointers and arrays, Pointer and character strings, Array of pointers, Pointers as function arguments, Functions returning pointers, Pointer to function, Pointer and structure</p>	10	CO3

Module 4: File Management in C	Introduction, Defining and opening a file ,Closing a file, Input/Output Operations on Files ,Error handling during I/O operations, Command Line Arguments	10	CO4
The Preprocessor	Macro substitution, File inclusion, Compiler Control Directives		
	Total:	40	

Practical: Programming Lab with C

Course Code: BCA192

Credit: 2

Skills to be developed:

Intellectual skills:

1. Ability to read, understand and write computer programs.
2. Ability to analyze problems and provide program based solution

List of Practical:

1. Write a c program to display the word "welcome".
2. Write a c program to take a variable int and input the value from the user and display it.
3. Write a c program to add 2 numbers entered by the user and display the result.
4. Write a c program to calculate the area and perimeter of a circle.
5. Write a C program to find maximum between two numbers.
6. Write a C program to check whether a number is divisible by 5 and 11 or not.
7. Write a C program to input angles of a triangle and check whether triangle is valid or not.
8. Write a C program to check whether a year is leap year or not.
9. Write a C program to input basic salary of an employee and calculate its Gross salary according to following:
 - a. Basic Salary ≤ 10000 : HRA = 20%,
DA = 80% Basic Salary ≤ 20000 :
HRA = 25%, DA = 90% Basic Salary
> 20000 : HRA = 30%, DA = 95%
10. Write a c program to print "welcome" 10 times.
11. Write a c program to print first n natural numbers using while loop.
12. Write a c program to print all the odd numbers in a given range.
13. Write a c program to add first n numbers using while loop.
14. Write a c program to print all numbers divisible by 3 or 5 in a given range.
15. Write a c program to add even numbers in a given range.
16. Write a c program to find the factorial of a given number.
17. Write a c program to find whether a number is prime or not.
18. Write a c program to print the reverse of a number.
19. Write a c program to add the digits of a number.
20. Write a c program to print the fibonacci series in a given range.
21. Write a c program to check whether a number is an Armstrong number or not.
22. Write a c program to find g.c.d. and l.c.m. of two numbers.

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
E. Balaguruswamy	Programming in ANSI C	8th Edition	Tata McGraw-Hill
Gary J. Bronson	A First Book of ANSI C	4th Edition	ACM

Reference Books:

Byron Gottfried	Schaum's Outline of Programming with C		McGraw-Hill
Kenneth A. Reek	Pointers on C		Pearson
Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language		Prentice Hall of India

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer with moderate configuration
2.	A programming language compiler

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCA103 CO1	S	M	M	M								
BCA103 CO2	S	S	S	M	M							
BCA103 CO3	S	S	S	M	M							
BCA103 CO4	S	S	S	S	S							

Name of the Course: BCA	
Subject: Environment Studies	
Course Code: BCA183	Semester: 1st
Duration: 28 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 0	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 2	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To enable critical thinking in relation to environmental affairs.
2	Understanding about interdisciplinary nature of environmental issues
3	Independent research regarding environmental problems in form of project report
4	Understand social interactions by which human behave and cultural values that underlay behaviors.
Objective:	
Sl. No.	
1	To create awareness about environmental issues.
2	To nurture the curiosity of students particularly in relation to natural environment.
3	To develop an attitude among students to actively participate in all the activities regarding environment protection
4	To develop an attitude among students to actively participate in all the activities regarding environment protection
Pre-Requisite:	
Sl. No.	
1.	Knowledge of Class X standards of Biology, Chemistry

Course Outcome:			
1.	Recall the terms involved in pollution.		
2.	Understand the different sources and effects of air pollution.		
3.	Understand various sources, types of pollutants causing water pollution.		
4.	Know Soil, Noise, Thermal and Radioactive Pollutants and their effects. Study of various pollution control measures.		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Environment	Environmental science, Environmental segment, Nomenclature, Basic concept related to environmental perspective, Objective of environmental education Mathematics of population growth, Environmental degradation, Acid rain, Toxic Elements, Particulates, Pollution prevention, Environmental problems and sustainable development, Environmental impact assessment	8	CO1
Module 2: Air, Water & Land Pollution	Atmosphere structure, Earth's radiation balance, Global atmospheric change Green House effect, Global warming and its consequences, Atmospheric stability, Atmospheric dispersion, Stack and Plume, Temperature inversion Chlorofluorocarbons, Ozone, Toxic chemical in the environment, Carbon monoxide (CO), Sulphur dioxide, oxides of Nitrogen, Smog, Control of air pollution, Hydrosphere, hydrological cycle, pollutants in water, biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil pollution in marine environment, Water quality, Eutrophication, Ground Water, Hydraulic gradients, Darcy's Law, Flow Velocity, Water treatment Operation, Hardness of water, Lithosphere, Solid waste pollution, Classification of solid wastes, Solid waste Management, Hazardous wastes, Hazardous waste management, Soil	12	CO2, CO3
Module 3: Ecology	Ecology, Classification of Ecology, Ecological pyramids, Components of Ecosystem, Food chain, Food Web, Types of Food chain, Biogeochemical cycles	5	CO1
Module 4: Noise Pollution and Control	Sound and its general features, Measurement of noise level, Noise classification, Noise measurements, Harmful effects of noise pollution Noise pollution control	3	CO4
	Total:	28	
Assignments: Based on the curriculum as covered by the subject teacher.			
List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Basu, M. and Xavier, S.	Fundamentals of Environmental Studies		Cambridge University Press, 2016
Mitra, A. K and Chakraborty, R.	Introduction to Environmental Studies,		Book Syndicate, 2016.

Dr. Debapriya De & Dr. Debashish De	Fundamentals of Environment & Ecology	1st edition, S.Chand	
Basu, R.N	Environment		University of Calcutta
Reference Books:			
Agrawal, KM, Sikdar, PK and Deb	A Text book of Environment		Macmillan Publication

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MOOCS102 CO1						M						
MOOCS102 CO2				M								
MOOCS102 CO3				M								
MOOCS102 CO4						S						

Paper name: ESSENTIAL STUDIES FOR PROFESSIONALS-I

Code: BCA(GS)101
CONTACT HOUR: 1L

Subject Code: BCA(GS)101	Semester: 1st
Subject Name: ESSENTIAL STUDIES FOR PROFESSIONALS I	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of humanities & social science subjects till class 10th standard and knowledge of Economics up to class 11th standard.	

Course Outcomes:

1. Students will learn advance tricky approach for solving Quantitative Aptitude questions.
2. It will enhance students skill to appear in various aptitude test within limited time constrain.
3. This module will enhance students Analytical skill & will also improve quick decision-making skill.
4. Students can prepare various competitive exams and different placement aptitude test as well.
5. Good analytical skill and sound knowledge in analogies will also enhance student's interview facing skill.

Course Content:

Module No.	Description
1.	Constitution of India: History of Constitution, Preamble, Fundamental Rights, Directive Principle of State Policy and Fundamental Duties
2.	History: Indus Valley Civilization, Vedic Civilization, 16 Mahajanpadas, Mauryan Dynasty.
3.	Geography: Physiographic Division of India- Geological history of India, Northern Mountain, Mineral Resources of India.
4.	Economics: Basic Concept of Economics, National Income, Unemployment and Poverty
5.	Current affairs and Static GK: Monthly Current Affairs Magazine

Learning Resources:

Text Books:

1. Indian Constitution- M. Laxmikant
2. Indian Economy-Ramesh Singh
3. Ancient and Medieval India- Poonam Dalal Dahiya
4. Geography of India- Majid Hussain

Reference Books:

1. Current Affairs Magazine of IEM-UEM
2. Lucent GK

**PAPER NAME: SKILL DEVELOPMENT FOR
PROFESSIONALS-I**

PAPER CODE: BCA(GS)181

CONTACT HOUR: 1L

Subject Code: BCA(GS)181	Semester: 1st
Subject Name: SKILL DEVELOPMENT FOR PROFESSIONALS -I	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of Quantitative Aptitude, Logical Reasoning & Verbal English.	

Course Outcomes:

1. It will improve verbal ability skill among students.
2. Students will communicate effectively & appropriately in real life situation.
3. It will enhance students problem-solving skill.
4. Students will be able to prepare for various public and private sector exams & placement drives.

Course Content

Module No.	Description
1.	Quantitative Aptitude 1) Quant foundation- Vedic Maths & Collective tricks. 2) Basic Multiplication – multiplying by numbers ending in zeroes, Multiplying by 2,3,4,5,6,7,8,9, 11,12 & 111.Multiplying 2 digits numbers ending in 9 & whose tens digit at to 10, Multiplying by 2 digits number of 9, multiplying by any 2-digit numbers ending in 9 3) Division- Divisibility by 2,3,4,5,6,7,8, 9, 11 & 13; Dividing by 5,9, 15,25,125, Dividing by Factors. 4) Squaring numbers- squaring any 2-digit numbers ending in 5, squaring any number ending in 5, squaring any 3digit numbers ending with 25, squaring any numbers ending in 9, squaring any numbers consisting only nines. Squaring any 2-digit numbers. Cube & cube roots. 5) Percentage- Basic concept of percentage & it's shortcut rules & their applications. 6) Ratio- Basic concept of Ratio & Proportion, Shortcut tricks & their applications. 7) Simple equation- Linear equation of 2 & more than two variables. 8) Variation- Ratio, Proportion, Variation, concept of directly proportional. 9) Partnership – concept, rules & Applications, Percentage Advanced problems & shortcuts. 10) Profit & Loss- Basic concept, formulae, shortcut tricks & their application.

2.	<p>Logical Mental ability -1</p> <p>1) Coding And Decoding & Direction Sense a) Conditional Coding, b) Word-Pattern Coding, c) Chinese Coding, d) Direction Sense Test, e) Direction Distance Test, f) Shadow based Questions.</p> <p>2) Series & Numbers a) Alphabet Series, b) Random Series, c) Number Series, d) Letter Gap, e) Missing Number Series, f) Series Completion, g) Order and Ranking, h) Interchange, i) Comparison</p> <p>3) Blood Relations Family Tree Questions, Indication Type BR, Coding Blood Relations, Miscellaneous Blood Relations</p> <p>4) Analogy Word Analogy, Classification, Odd-Out</p>
3.	<p>Objective English-1</p> <p>1) Introduction of Parts of speech: Introduction, Brief discussion of Parts of speech</p> <p>2) What is noun, Kinds of Noun, Rules & Application.</p> <p>3) Definition of Pronoun, Examples, Rules & Application</p> <p>4) Definition of Verb, Kinds of Verb, Rules & Application, Definition of Tense, Different types of Tenses, Examples, Rules & Application</p> <p>5) Definition of Adjective, Kinds of Adjective, Rules & Application,</p> <p>6) Definition of Adverb, Kinds of Adverb, Rules & Application</p> <p>7) Definition of Preposition, Examples, Rules & Application,</p> <p>8) Definition of Interjection, Examples, Rules & Its Application,</p> <p>9) Definition of Conjunction, Examples, Rules & Application</p> <p>10) Different types of Articles, Examples, Rules & Application English Grammar. Newspaper reading: The Hindu & Economic Times.</p>
4.	Data Interpretation level-I.

Learning Resources:

Text Books:

1. Objective General English- S.P Bakshi
2. English Grammar and Competition-S.C Gupta
3. Fast Track Objective Arithmetic- Rajesh Verma
4. Quantitative Aptitude– S.Chand

Reference Books:

1. Advance Maths- Rakesh Yadav
2. Verbal and Non-Verbal Reasoning- R.S Agarwal
3. A new approach to Reasoning- BS Sijwali

Semester II							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC3	BCA201 BCA291	Computer Architecture Computer Architecture Laboratory	4	0	4	6
2	CC4	BCA203	Discrete Structure	5	1	0	6
3	AECC-2	BCA204	Soft Skills	2	0	0	2
4	GE-2		Any one from GE basket.	4 / 5	0 / 1	4 / 0	6
Non-Credit Industry Value Added Course							
5	NIVAC4	BCA(GS) 201	Essential Studies For Professionals - II	1	0	0	2
6	NIVAC5	BCA(GS)281	Skill Development For Professionals - II	1	0	0	1
7	NIVAC6	MC281	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				24

Name of the Course: BCA	
Subject: Computer Architecture	
Course Code: BCA201 and BCA 291	Semester: 2nd
Duration: 40 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam:70
Tutorial: 0	Continuous Assessment: 30
Practical: 4	Practical Sessional internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	To be able to understand the functionality, organization and implementation of computer system.
2.	To gain Skill to recognize the instruction codes and formats.
3.	Knowledge of the internal working of main memory, cache memory, associative memory and various modes of data transfer.
Objective:	
Sl. No.	
1.	To enable the students to understand the functionality and implementation of computer system.
2.	To familiarize with the various instruction codes and formats of different CPUs.
3.	To introduce the students to I/O and memory organization of computer system
4.	To deliver an overview of Control Unit of a computer system
5.	To learn the usage of parallel and vector processing.
Pre-Requisite:	
Sl. No.	None
Course Outcome:	
1.	An ability to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.
2.	An ability to understand the functions of various hardware components and their building blocks.
3.	An in depth understanding of sequential, Combinational circuits.
4.	An ability to understand computer buses and input/output peripherals and memory hierarchy and design of primary memory.

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Data Representation Register Transfer and Micro operations Basic Computer Organization and Design	<p>Number Systems – decimal, binary, octal, hexadecimal, alphanumeric representation, 2. Complements – 1's complement, 2's complement, 9's complement, 10's complement, [r-1]'s complement, r's complement, 3. Fixed point representation – Integer representation, arithmetic addition, arithmetic subtraction, overflow, decimal fixed point representation, 4. Floating point representation, 5. IEEE 754 floating point representation</p> <p>Register transfer language, Register transfer, Bus system for registers, Memory transfers – memory read, memory write, Micro operations – register transfer micro operations, arithmetic micro operations, logic micro operations, shift micro operations, Binary adder, binary adder subtractor, binary incrementer, arithmetic circuit for arithmetic micro operations, One stage logic circuit, Selective set, Selective complement, Selective clear, Mask, Insert, Clear</p> <p>Instruction code, computer register, computer Instruction, timing & control, Instruction cycle, Memory reference instruction, Input output and interrupt, complete computer description, Design of basic computer, design of accumulator logic.</p>	12	CO1
Module 2: Programming the Basic Computer Central Progressing Unit (CPU)	<p>Introduction, Machine Language, Assembly Language, The assembler, Programming loop, Programing arithmetic and logic operation, subroutine, Input Output programming</p> <p>Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC)</p>	8	CO2
Module 3: Pipeline and Vector Processing Computer	<p>Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors</p> <p>Introduction, Addition and subtraction, Multiplication algorithm, division algorithm, Floating point arithmetic</p>	10	CO3

Arithmetic	operation, Decimal arithmetic unit, Decimal arithmetic operation		
Module 4: Input-Output Organization	Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication	10	CO4
Memory Organization	Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware		
	Total:	40	

Practical: (Computer Architect Lab)

Course Code: BCA 291

Credit: 2

Skills to be developed:

Intellectual skills:

1. Ability to understand the functionality, organization and implementation of computer system.
2. Skill to recognize the instruction codes and formats.
3. Knowledge of the internal working of main memory, cache memory, associative memory and various modes of data transfer.
4. Familiarization with the working of parallel processing and vector processing

List of Practical:

1. Basic gates and Universal gates. Implementation of Half & full adder. Half & full subtractor,
2. 4 bit logical unit, 4 bit arithmetic unit, BCD adder, 4 bit adder/ subtractor, Carry look ahead adder, Design of ALU for multi bit operation, comparators.
3. 8:1 MUX IC verification, 16:1 MUX using IC 74151, dual 2 to 4 Decoder/ Demultiplexer IC evaluation. Priority encoder.
4. Decoder, Encoder

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books			
Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
M. Morris Mano	Computer System Architecture		PEARSON
William Stallings	Computer Organization & Architecture – Designing For Performance		PEARSON
Reference Books:			
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1.	Computer with moderate configuration		
2.	Xilinx ISE 8.2i		

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCA201 CO1	S	S										
BCA201 CO2		S		M								
BCA 201 CO3			S									
BCA 201 CO4			S		S							

Name of the Course: BCA Subject: Discrete Structure	
Course Code: BCA203	Semester: 2nd
Duration: 60 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 6	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	The aim of this course is to introduce you with a new branch of mathematics which is discrete mathematics, the backbone of Computer Science.
2	In order to be able to formulate what a computer system is supposed to do, or to prove that it does meet its specification, or to reason about its efficiency, one needs the precision of mathematical notation and techniques. The Discrete Mathematics course aims to provide this mathematical background.
Objective: Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following	
Sl. No.	
1	Use mathematically correct terminology and notation.
2	Construct correct direct and indirect proofs.
3	Use counterexamples.
4	Apply logical reasoning to solve a variety of problems.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of basic algebra
2.	Ability to follow logical arguments.
Course Outcome:	

1.	Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.		
2.	Understand the basics of discrete mathematics, propositional logic and number theory, and be able to apply the methods from these subjects in problem solving.		
3.	Be able to use effectively algebraic techniques to analyse basic discrete structures and algorithms.		
4.	Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Set Theory	Basic Concepts of Sets, Subset, Power Set, Universal Set, Venn-Euler Diagram, Set Operations, Laws of the Algebra of Sets, Ordered Pair, Relations, Mapping	14	CO1
Module 2: Group, Ring and Field, Propositional Logic, Generating Function and Recurrence Relations	Binary Operation, Algebraic Structure, Semi-Group Monoid ,Group, Some theorems on Groups, Ring, Properties of Ring, Integral Domain, Field, Binary Operation, Algebraic Structure ,Semi-Group, Monoid , Group, Some theorems on Groups, Ring, Properties of Ring, Integral Domain, Field, Introduction to Proposition or Statement, Truth Table, Logical Connectives, Propositional Formula, Tautology, Contradiction, Logical Equivalence, Algebraic laws of Connectives, Conjunctive Normal Form (CNF),Disjunctive Normal Form (DNF),Arguments, Sequence, Generating Functions, Recurrence Relations and it's Solution	20	CO2
Module 3: Graph and Its Fundamentals , Trees and Fundamental Circuit	Concept of Graph, Graph and Related Terms, Di- Graph (Directed Graph),Theorems of Graph, Trees and related Terms ,Binary Trees ,Theorems on Trees ,Theorems on Binary Trees ,Spanning Tree and Co-Tree ,Finding a Spanning Tree of a Connected Graph, Weight of an edge and Weighted Graph ,Minimal Spanning Tree ,Kruskal's Algorithm of finding Minimal Spanning Tree ,Prim's Algorithm of finding Minimal Spanning Tree	16	CO4
Module 4: Automata, Mealy Machine & Moore Machine	Automata, Deterministic Automata, Deterministic Finite Accepters (DFA),Automata and its Transition Graphs, Extended Transition Function, Mealy Machine, Moore Machine	10	CO3
	Total:	60	

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
B.K.Pal and K.Das	BCA Mathematics Vol-1		U.N.DHUR & SONS Private ltd
B.K.Pal and K.Das	BCA Mathematics Vol-3		U.N.DHUR & SONS Private ltd

CO & PO Mapping:

[illegible]

Name of the Course: BCA	
Subject: Soft Skills	
Course Code: BCA204	Semester: 2nd
Duration: 34 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 0	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 2	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	Ability to read English with understanding and decipher paragraph patterns ,writing techniques and conclusions.
2	Skill to develop the ability to write English correctly and master the mechanics of writing the use of correct punctuation marks and capital letters.
3	Ability to understand English when spoken in various contexts.
Objective:	
Sl. No.	
1	To enable the learner to communicate effectively and appropriately in every situation.
2	To use English effectively for study purposes across the curriculum.
3	To use R, W, L, S and integrate the use of four language skills, reading, writing, listening & speaking.
4	To revive and reinforce structures already learnt.
Prerequisite:	
Sl. No.	

1.	Basic knowledge about Spoken English		
Course Outcome:			
1.	Students will learn to handle emotions including tolerance and behavioral responses, building positive friendships and bonding with peers and classmates.		
2.	Students will learn the basics of effective communication in the professional world.		
3.	Students will develop and maintain constructive working relationships and communicate effectively both written & spoken.		
4.	Students will learn time and resource management, conflict resolution, teaching and mentoring others.		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module I: Basic Grammar	Sentence construction/correction, Fill in the blanks, Vocabulary/word formation, Synonyms, Antonyms, Homophones, Homonyms, One-word Substitution, Idioms and Phrases	8	CO2
Module II: Conversation Techniques	Self – introduction, starting a conversation, joining a conversation, asking for information, giving instructions, describing things, story narration, presentation techniques	13	CO1
Module III: Reading & Listening	Skimming, scanning, reading techniques, engaging effectively, understanding difference between hearing & listening	4	CO2
Module IV: Netiquette	Drafting email, email etiquette, civility online	4	CO3
Module V : Balancing professional life	Time management, stress management, manners & etiquette, team work	5	CO4
	Total	34	
Assignments:			
Based on the curriculum as being covered by the subject teacher.			

List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Varinder Kumar	Business Communication	2 nd Edition	Kalyani Publication
Reference Books:			
Chaturvedi & Chaturvedi	Business Communication	7 th Edition	Pearson

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCA204 CO1												M
BCA204 CO2									S			
BCA204 CO3										S		
BCA204 CO4								M				

**Paper name: ESSENTIAL STUDIES FOR
PROFESSIONALS Code: BCA(GS)201
CONTACT HOUR: 1L**

Subject Code: BCA(GS)201	Semester: 2nd
Subject Name: ESSENTIAL STUDIES FOR PROFESSIONALS II	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of humanities & social science subjects till class 10th standard and knowledge of Economics up to class 11th standard.	

Course Outcomes:

1. This part of the syllabus will create base of general knowledge among students which is required to appear in various competitive exams in public sector jobs (UPSC, SSC etc.)
2. It will inculcate their rights & duties to the society, it will help them to act according to law in society.
3. It will also improve basic banking knowledge among students.
4. This part of the syllabus will enhance knowledge on National & International Current Affairs among students.

Course Content:

Module No.	Description
1.	Constitution of India: Union Executive- President, Vice President, PM and Council of Ministers, Attorney General
2.	History: Arrival of the Europeans- Portuguese, Dutch, English, French; Land Revenue System, Economic Exploitation of British Rule, Socio-religious Reforms Movement.
3.	Geography: Physical Geography of India- Peninsular Plateau, Northern Great Plains, Coastal Plains, Soil of India.
4.	Economics: Banking System of India with reference to RBI, Capital Market
5.	Current affairs and Static GK: Monthly Current Affairs Magazine

Learning Resources:

Text Books:

1. Indian Constitution- M. Laxmikant
2. Indian Economy-Ramesh Singh
3. History of Modern India- Bepan Chandra
4. Geography of India- Majid Hussain

Reference Books:

1. Current Affairs Magazine of IEM-UEM
2. Lucent GK

**PAPER NAME: SKILL DEVELOPMENT FOR
PROFESSIONALS -II PAPER CODE: BCA(GS)281
CONTACT HOUR: 1L**

Subject Code: BCA(GS)281	Semester: 2nd
Subject Name: SKILL DEVELOPMENT FOR PROFESSIONALS -II	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of Quantitative Aptitude, Logical Reasoning & Verbal English.	

Course Outcomes:

1. Students will learn advance tricky approaches for solving Quant.
2. It will enhance student's skill to appear in various aptitude test within limited time constrain.
3. This module will enhance students' Analytical skill & will also improve quick decision-making skill.
4. Students can prepare various competitive exams and different placement aptitude test as well.

Course Content

Module No.	Description
1.	Quantitative Aptitude 1) Average- Concept on average, different missing numbers in average estimation, shortcuts & their application. 2) Mixture & Allegation – Proportion & mixtures in percentages, populations & liquids, shortcuts & their application. 3) Number System- concept of different numbers, remainder theorem, factors. 4) Time & Work- Basic concept, Different problems & their shortcut tricks. Time & Speed & Tides- concept of speed, time & Distance, relative speed, formulae & their application. Upstream & Downstream, Pipes & cistern.
2.	Logical Reasoning 1) Cube, Dice, Miscellaneous Problems 2) Data Sufficiency a) Problems on Blood Relation, ages, Numbers b) Logical Test Based on Data Sufficiency 3) Non-Verbal Reasoning a) Image Formation b) Water –Images c) Mirror Image d) Image completion e) Paper Cutting and Folding

3.	Objective English-2 1) Clauses: Definition, Examples, Rules & Application, Types of Sentences (Simple +Complex +Compound) Examples, Rules & Application, Voice- Concept, Types, Examples, Rules & Application, Narration Change- Rules (Direct & Indirect Speech) 2) Vocabulary:- Synonyms, Antonyms with examples, One word Substitution, Idioms & Phrases 3) Spotting Errors 4) Reading Comprehension (Level II)
4.	Data Interpretation level-II Newspaper reading: The Hindu & Economic Times

Learning Resources:

Text Books:

1. Objective General English- S.P Bakshi
2. English Grammar and Competition-S.C Gupta
3. Fast Track Objective Arithmetic- Rajesh Verma
4. Quantitative Aptitude– S.Chand

Reference Books:

1. Advance Maths- Rakesh Yadav
2. Verbal and Non-Verbal Reasoning- R.S Agarwal
new approach to Reasoning- BS Sijwali

Semester III							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC5	BCA301 BCA391	Data Structure with C Data Structure Lab with C	4	0	4	6
2	CC6	BCA302 BCA392	Object Oriented Programming with C++ Programming Lab with C++	4	0	4	6
3	CC7	BCA303	Operating System	5	1	0	6
4	SEC-1	BCAS301	Accounting	2	0	0	2
5	GE-3		Any one from GE basket.	4 / 5	0 / 1	4 / 0	6
Non-Credit Industry Value Added Course							
6	NIVAC7	BCA(GS)301	Essential Studies For Professionals - III	1	0	0	2
7	NIVAC8	BCA(GS)381	Skill Development For Professionals - III	1	0	0	1
8	NIVAC9	MC381	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				30

Name of the Course: BCA	
Subject: Data Structure with C	
Course Code: BCA301 and BCA393	Semester: 3rd
Duration: 40 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam:70
Tutorial: 0	Continuous Assessment: 30
Practical: 4	Practical Sessional internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	The point of this course is to give you a vibe for algorithms and data structures as a focal area of what it is to be a computer science student.
2.	You ought to know about the way that there are regularly a few calculations for some issue, and one calculation might be superior to another, or one calculation better in certain conditions and another better in others.
3.	You should have some idea of how to work out the efficiency of an algorithm.
4.	You will be able to use and design linked data structures
5.	You will learn why it is good programming style to hide the details of a data structure within an abstract data type.
6.	You should have some idea of how to implement various algorithms.
Objective:	
Sl. No.	
1.	To impart the basic concepts of data structures and algorithms.
2.	To understand concepts about searching and sorting techniques.
3.	To understand basic concepts about stacks, queues, lists, trees and graphs.
4.	To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures
Pre-Requisite:	
Sl. No.	
1.	Basics of programming language.
2.	Logic building skills.

Course Outcome:			
1.	Introduce the fundamental concept of data structures and abstract data types. Emphasize the importance of data structures in developing and implementing efficient algorithms.		
2.	Understand and apply amortized analysis on data structures, nonlinear data structure including tree, binary search trees, AVL tree, graph, applications of graph.		
3.	Describe linear data structure - arrays, records, linked structures, stacks, queues.		
4.	Discuss the computational efficiency of the principal algorithms for sorting & searching.		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction to Data Structures File Input/Output Structures Arrays	Introduction, Definition, Classification of Data Structure, Description of Various Data Structures, Memory Allocations in C, Algorithms, Algorithm Performance, Algorithm Analysis, Categories of Algorithms, Data Structure operations, Abstract Data Types	8	CO1
	Data Organization, File Operations, Opening a File, Reading from a File, Closing the File, Counting Characters, Tabs, Spaces, A File-copy Program, Writing to a File, File Opening Modes		
	Why Use Structures, Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures, Additional Features of Structures, Uses of Structures		
	Introduction, One Dimensional Array, Initializing One Dimensional Arrays, Accessing One Dimensional Arrays Elements, Implementation of One Dimensional Array in Memory, Passing Array to Functions, Insertion in One Dimensional Array, Deletion of Element One Dimensional Arrays, Traversing of an Array, Merging Two Arrays, Combining All Together, Multi-Dimensional Arrays, Initializing a Two Dimensional Array, Accessing Two Dimensional Arrays Elements, Implementation of Two Dimensional Array in Memory, Pointers and Arrays, Array of Pointers, Array of Structures, Array within the Structure, Sparse Matrix & Their Representation, Limitation of Linear Array		

Practical: (Data Structure Lab)**Course Code:** BCA393 **Credit:****2****Skills to be developed:**

Intellectual skills:

1. Skill to analyze algorithms and to determine algorithm correctness and their time efficiency.
2. Knowledge of advanced abstract data type (ADT) and data structures and their implementations.
3. Ability to implement algorithms to perform various operations on data structures.

List of Practical:

1. Implementation of array operations.
2. Stacks and Queues: adding, deleting elements.
3. Circular Queue: Adding & deleting elements
4. Merging Problem : Evaluation of expressions operations on Multiple stacks & queues
5. Implementation of linked lists: inserting, deleting, and inverting a linked list.
6. Implementation of stacks & queues using linked lists:
7. Polynomial addition, Polynomial multiplication
8. Sparse Matrices: Multiplication, addition.
9. Recursive and Non Recursive traversal of Trees Threaded binary tree traversal. AVL tree implementation Application of Trees.
10. Application of sorting and searching algorithms Hash tables' implementation: searching, inserting and deleting, searching & sorting techniques.

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Yashavant P. Kanetkar	Let Us C	Fifth Edition	
G S BALUJA	Data Structure Through C: A Practical Approach	Fourth Edition 2009-10	
Tannenbaum	Data Structure using C & C++	New Edition	PHI
Reference Books:			
Sartaj Sahni	Data Structures, Algorithms and applications in C++	Second Edition	Universities Press

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1.	Computer with moderate configuration
2.	GCC or higher/ C/C++ and other softwares as required.

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCA301 CO1	M				M							
BCA301 CO2			S									
BCA301 CO3			S									
BCA301 CO4		M		M								

Name of the Course: BCA	
Subject: Object Oriented Programming With C++	
Course Code: BCA302 and BCA392	Semester: 3rd
Duration: 40 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam:70
Tutorial: 0	Continuous Assessment: 30
Practical: 4	Practical Sessional internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	In-depth understanding of various concepts of object oriented programming language.
2.	Ability to read, understand and trace the execution of programs
3.	Skill to debug a program.
4.	Skill to write program code inC++ to solve real world problems.
Objective:	
Sl. No.	
1.	To introduce students to a powerful programming language
2.	To understand the basic structure of object oriented program
3.	To gain knowledge of various programming errors.
4.	To enable the students to make flowchart and design an algorithm for a given problem.
5.	To enable the students to develop logics and programs
Pre-Requisite:	
Sl. No.	
1.	Basics of programming language.
2.	Logic building skills.
Course Outcome:	
1.	Students will be able to learn different programming techniques using object-oriented technology with C++.
2.	Students will be able to learn how to solve real life problems by implementing data security, reuse of code, polymorphism etc
3.	Students will be able to learn how to solve real life problems by using pointer, virtual function and FILE handling.
4.	Students will be able to learn how to solve real life problems by implementing exception handling and generic programming

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction of Object Oriented Programming	Software crisis, Software evolution, A look of object oriented programming, Object oriented programming paradigm, Basics of object oriented programming, Benefits of object oriented programming, Object oriented languages, Applications of object oriented programming	8	CO1
Introduction of C++	Application of C++, A simple C++ program, More C++ statements, An example with Class, Structure of C++ program, Creating a source file, Compiling and linking		
Tokens and Keywords	Tokens, Keywords, Identifiers and constants, Basic data types, User defined data types, Derived data types, Symbolic constants, Type compatibility, Declaration of variables, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator, Member dereferencing operators, Memory management operators, Manipulators, Type cast operator, Expressions and their types, Special assignments expressions, Implicit conversions, Operator overloading, Operator precedence, Control structures		
Functions	Introduction, The main function, Function prototyping, Call by reference, Return by reference, Inline functions, Default arguments, Const arguments, Function overloading, Friend and virtual functions, Math library function		

Module 4:		10	CO4
Template	Introduction to generic programming, Class templates, Class templates with multiple parameters, Function templates, Function templates with multiple parameters, Overloading of template functions, Member function templates, Non-type template arguments		
Exception Handling	Introduction of exception, Basics of exception handling, Exception handling mechanism, Throwing mechanism, Catching mechanism, Rethrowing an exception, Specifying exceptions		
Standard Template Library	Components of STL, Containers, Algorithms, Iterators, Application of container classes, Function objects		
	Total:	40	

Practical: (Programming lab with C++)

Course Code: BCAC392

Credit: 2

Skills to be developed:

Intellectual skills:

1. Ability to read, understand and write object oriented programs.
2. Ability to analyze problems and provide program based solutions.

List of Practical:

1. Basic programming structures
2. Class and Objects
3. Constructors
4. Overloading(Function and Operator)
5. Inheritance
6. Overriding
7. Exception Handling
8. Pointers
9. Template
10. Standard Template Library

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books			
Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
E.Balagurusamy	OBJECT ORIENTED PROGRAMMING WITH C++	Forth Edition	Tata McGraw Hill
Johnston	C++ Programming Today	Fourth Edition	PHI
Reference Books:			
Herbert Schildt	C++: The Complete Reference	Fourth Edition	Tata McGraw Hill
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1.	Computer with moderate configuration		
2.	g++ compiler and other software's as required.		

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										
CO2	M	S	S									
CO3	S	M	S									
CO4	S		M	S								

Name of the Course: BCA Subject: Operating Systems	
Course Code: BCA303	Semester: 3rd
Duration: 60 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 0	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 2	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To understand the principles and tasks of operating systems.
2	Ability to apply CPU scheduling algorithms to manage tasks.
3	Initiation into the process of applying memory management methods and allocation policies.
4	Knowledge of methods of prevention and recovery from a system deadlock.
Objective:	
Sl. No.	
1	To deliver a detailed knowledge of integral software in a computer system –Operating System.
2	To understand the working of operating system as a resource manager.
3	To familiarize the students with Process and Memory management.
4	To describe the problem of process synchronization and its solution.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of Class X standards of Biology, Chemistry
Course Outcome:	
1.	Analyze the concepts of processes and threads in operating system
2.	Illustration of the scheduling of processor for a given problem instance
3.	Analyze memory management techniques, concepts of virtual memory.
4.	Identify the dead lock situation and provide appropriate solution so that protection and security of the operating system is also maintained.

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction Operating-System Structures Processes Threads	What is an Operating system, Mainframe system, Desktop system, Multiprocessor system, Distributed system, Clustered Systems, Real-time systems System Components, OS Services, System calls, System Programs, System Structure Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication, Communication in Client–Server Systems Overview, Multithreading Models, Threading Issues	15	CO1
Module 2: CPU Scheduling Process Synchronization Deadlocks	Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time CPU Scheduling Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	15	CO2
Module 3: Memory Management Virtual Memory Mass-Storage Structure	Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table, Segmentation with paging Background, Demand Paging, Page Replacement, Allocation of Frames, Thrashing Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure	15	CO3
Module 4: File-System Interface File-System Implementation	File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance	15	CO4
	Total:	60	

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
A.Silberschatz, P.B. Galvin, G.Gagne	Operating System Concepts	6 th Edition	John Wiley & Sons, Inc
Reference Books: An Introduction to Operating System, Bhatt, PHI			

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCA303 CO1	M	S										
BCA303 CO2			S									
BCA303 CO3			S									
BCA303 CO4		M		S								

Subject: Accounting
Course Code: BCAS301

Name of the Course: BCA			
Subject: Accounting (BCAS301)			
Course Code: BCAS301		Semester: 3rd	
Duration: 60 Hours		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial: 1		Internal Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation:	
Credit: 6		Practical Sessional external examination:	
Aim:			
Sl. No.			
1.	Build a foundation to understand the various concepts of Financial Accounting		
2.	Gain a better understanding of Accounting Mechanics, Accounting Standards and dealing with Financial Statements of Companies		
Objective:			
Sl. No.			
1.	To articulate the financial concepts of accounting in companies		
2.	To gain a clear understanding of Financial Accounting with the help of case studies		
Pre-Requisite:			
Sl. No.			
1.	NA		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01 Introduction to Accounting	<ul style="list-style-type: none">Introduction to concepts of AccountingConcept and necessity of AccountingAn Overview of Income Statement and Balance Sheet.	2	6
02 Introduction and Meaning of GAAP	<ul style="list-style-type: none">Introducing the meaning of GAAPConcepts of AccountingImpact of AccountingConcepts on Income Statement and Balance Sheet.	2	6
03 Accounting Mechanics	<ul style="list-style-type: none">Understanding of Accounting MechanicsProcess leading to preparation of Trial Balance and Financial Statements	2	6
04 Preparation of Financial Statements with	<ul style="list-style-type: none">Understanding the Preparation of Financial Statements with Adjustment Entries.	2	6

Adjustment Entries.			
05 Revenue Recognition and Measurement	<ul style="list-style-type: none"> Describing Revenue Recognition and Measurement Capital and Revenue Items Treatment of R & D Expenses Preproduction Cost Deferred Revenue Expenditure etc. 	2	6
06 Fixed Assets and Depreciation Accounting	<ul style="list-style-type: none"> Describing Fixed Assets and Depreciation Accounting Evaluation and Accounting of Inventory 	2	6
07 Preparation and Complete Understanding of Corporate Financial Statements	<ul style="list-style-type: none"> Preparation and Complete Understanding of Corporate Financial Statements 'T' Form and Vertical Form of Financial Statements. 	2	6
08 Important Accounting Standards	<ul style="list-style-type: none"> Corporate Financial Reporting – Analysis of Interpretation thereof with reference to Ratio Analysis. Fund Flow, Cash Flow. Corporate Accounting. Accounting of Joint Stock Companies: Overview of Share Capital and Debentures, Accounting for Issue and forfeiture of Shares, Issue of Bonus Share, Issue of Debentures. 	2	6
09 Financial Statements of Companies	<ul style="list-style-type: none"> Financial Statements of Companies: Income Statement and Balance Sheet in Schedule VI. Provisions of the Companies Act: Affecting preparation of Financial Statements, Creative Accounting, Annual Report, Presentation and analysis of Audit reports and Directors report. (Students should be exposed to reading of Annual Reportsof Companies both detailed and summarized version). 	2	6
10 Inflation Accounting & Ethical Issue in Accounting	<ul style="list-style-type: none"> Describing Inflation Accounting & Ethical Issue in Accounting 	2	6
11 Case Studies and Presentations	<ul style="list-style-type: none"> Case Studies and Presentations 	10	10
	Sub Total:	30	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:		100
Assignments: Based on the curriculum as covered by the subject teacher			

List of Books			
Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
P C Tulsian ,	Financial Accounting	2002/ 9788177582284	Pearson
Gregory Becker	Accounting Principals: The ultimate Beginners Guide to Accounting	978-1081670290	Pearson
Reference Books:			
M C ShuklaS C GuptaT S Grewal	Advanced Accounting Vol - I	2018/ 9352533022 978-	S.CHAND
M C ShuklaS C GuptaT S Grewal	Advanced Accounting Vol - II	2018/ 8121911009 978-	S.CHAND

**PAPER NAME: ESSENTIAL STUDIES FOR PROFESSIONALS -
IIIPAPER CODE: BCA(GS)301
CONTACT HOUR: 1L**

Subject Code: BCA(GS)301	Semester: 3rd
Subject Name: ESSENTIAL STUDIES FOR PROFESSIONALS	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of humanities & social science subjects till class 10th standard and knowledge of Economics up to class 11th standard.	

Course Outcomes:

1. To inculcate human values and ethical thinking among students.
2. To prepare the stage for facing different levels of civil service and other competitive examinations.
3. To prepare the ground for making them aware of the happenings, cultural historical and developmental aspects of the country as well as global affairs.

Course Content:

Module No.	Description
1.	Constitution of India Central Legislative System of India, State Legislative System of India, Indian Judiciary
2.	History: Islam and Early Muslim Invaders, Delhi Sultanate, Bhakti and Sufi Movement.
3.	Geography: Rivers of India, Vegetation of India, Climate of India, Transport of India
4.	Economics: Tax System of India, Balance of Payment, Industrial Reforms
5.	Current affairs and Static GK: Monthly Current Affairs Magazine

Learning Resources:

Text Books:

1. Indian Constitution- M. Laxmikant
2. Indian Economy-Ramesh Singh
3. Ancient and Medieval India- Poonam Dalal Dahiya
4. Geography of India- Majid Hussain

Reference Books:

1. Current Affairs Magazine of IEM-UEM
2. Lucent GK

**PAPER NAME: SKILL DEVELOPMENT FOR
PROFESSIONALS -IIPAPER CODE: BCA(GS)381
CONTACT HOUR: 1L**

Subject Code: BCA(GS)381	Semester: 3rd
Subject Name: SKILL DEVELOPMENT FOR PROFESSIONALS -III	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of Quantitative Aptitude, Logical Reasoning & Verbal English.	

Course Outcomes:

1. To enhance the problem-solving skills, to improve the basic mathematical & Logical Skills and to help students who are preparing for any type of competitive examinations.
2. To provide best possible training for the students through continuous training module.
3. To prepare students for the campus recruitment program's aptitude Test.
4. To enhance problem solving skill using fast track techniques without using calculator.

Course Content

Module No.	Description
1.	Quantitative Aptitude 1) Simple & Compound Interest- Basic concept of SI & CI, different formulas & their applications, concept of Growth & Contraction of Business. 2) Data Interpretation- Tables, pie chart, histogram, Bar chart, solution tricks & techniques. 3) Quant Review- Miscellaneous problems from different chapters & short cuts. 4) Indices & Surds- Basic concept, Formulae & their applications, Finding out the square roots, Elimination of Surds, Equation solve. 5) Quadratic Equation- Polynomials, degree, powers, Equation & factors Solution. Progression- Concept of AP, GP & HP
2.	1) Syllogism a) Logical Venn diagram b) The If Else Statement 2) Puzzles a) Seating Arrangement b) Classification c) Seating Arrangement with Blood relations 3) Machine Input-Output a) Pattern Based I/O 4) Inequality a) Coded Inequality, b) Jumbled Inequality, c) Conditional inequality

3.	1) Sentence Corrections 2) Fill the blanks with appropriate words/articles/preposition/verbs/adverbs/conjunction. 3) Reading Comprehension (Advance Level) 4) Vocabulary
4.	Data interpretation Advanced Level.

Learning Resources:

Text Books:

1. Objective General English- S.P Bakshi
2. English Grammar and Competition-S.C Gupta
3. Fast Track Objective Arithmetic- Rajesh Verma
4. Quantitative Aptitude– S.Chand

Reference Books:

1. Advance Maths- Rakesh Yadav
2. Verbal and Non-Verbal Reasoning- R.S Agarwal
new approach to Reasoning- BS Sijwali

Semester IV							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC8	BCA401 BCA491	Database Management Systems Database Management Systems Lab	4	0	4	6
2	CC9	BCA402	Computer Networking	5	1	0	6
3	CC10	BCA403 BCA493	Programming with Java Programming Lab with Java	4	0	4	6
4	SEC-2	BCAS401	Web Design and Development	2	0	0	2
5	GE-4		Any one from GE basket.	4 / 5	0 / 1	4 / 0	6
Non-Credit Industry Value Added Course							
6	NIVAC10	BCA(GS)401	Essential Studies For Professionals - IV	1	0	0	2
7	NIVAC11	BCA(GS)481	Skill Development For Professionals - IV	1	0	0	1
8	NIVAC12	BCAN-481	Business Communication	2	0	0	1
9	NIVAC13	MC481	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				31

Name of the Course: BCA	
Subject: Database Management Systems	
Course Code: BCA401 and BCA491	Semester: 4 th
Duration: 40 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam:70
Tutorial: 0	Continuous Assessment: 30
Practical: 4	Practical Sessional internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	Familiarization with Database Management System.
2.	Comprehensive knowledge of database models.
3.	Ability to code database transactions using SQL.
Objective:	
Sl. No.	
1.	To introduce the students to the database system.
2.	To learn how to design a database by using different models.
3.	To enable the students to understand the database handling during execution of the transactions.
4.	To understand the handling of database by concurrent users.
5.	To gain complete knowledge of SQL and PL/SQL.
Pre-Requisite:	
Sl. No.	
	NONE
Course Outcome:	
1.	Students will be familiarize with different concepts of DBMS, it's applications. They will able to draw and understand ER diagram and can develop systems from ER modeling.
2.	Students will be introduced and familiarize with relational algebra and SQL queries. They will be able to use different DDL, DML and DCL commands.
3.	Student will get clear concepts of normalization, different normal forms and will have command on file management.
4.	Students will be aware of Transaction management, 2PL, locking and different schemes of indexing techniques.

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction of DBMS ER Modeling	<p>Introduction, Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Data Abstraction, Three Schema architecture of DBMS.</p> <p>Need for E-R Model, Various steps of database design, Mapping Constraints, E-R diagram, Subclass, Generalization, Specialization, Aggregation, Strong Entity-Weak Entity</p>	8	CO1
Module 2: Relational Algebra SQL	<p>Concepts of Relational Algebra, Use and applications of different set and relational operators such as selection, projection, Cartesian product, joining etc.</p> <p>Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Stored procedures, cursors and triggers.</p>	12	CO2
Module 3: Relational Model and Normalization File management and query optimization	<p>Concept of Relational Model, Design Issues, Keys, Closure set, Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce- Codd Normal Form, 3NF, Normalization using multivalued dependencies, 4NF, 5NF, Centralized and distributed database</p> <p>Concepts of File and Records, Fixed Length-Variable length Record, Query optimization.</p>	12	CO3
Module 4: Indexing Transaction Management	<p>Concepts of Indexing, its importance, use and applications, Different types of Indexing. Example and use of Primary, secondary, clustering, Multilevel Indexes.</p> <p>Transaction definition, properties, transaction state diagram, commit and rollback, Concurrency control, lock based protocols, two phase locking, Recovery management.</p>	8	CO4
	Total:	40	

Practical: (Database Management Systems Lab)**Course Code:** BCA491**Credit:** 2**Skills to be developed:**

Intellectual skills:

1. Ability to read, understand and write SQL queries.
2. Familiarize with triggers, stored and transaction management procedures.

List of Practical:

1. Basics of SQL and different types of queries that should cover major portion of DDL,DML structures.
2. Introduction to Stored procedure, triggers and transaction management.

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Henry F. Korth and Silberschatz Abraham	Database System Concepts		Mc.Graw Hill
Ramez Elmasri, Shamkant B.Navathe	Fundamentals of Database Systems		Addison Wesley

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1	Computer with Oracle/ any other DBMS package installed.

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S									
CO2	S	S	S	M	S							
CO3	S	M	S	S	S							
CO4	M	S	S	S								

Name of the Course: BCA	
Subject: Computer Networking	
Course Code: Computer Networking	Semester: 4th
Duration: 60 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 5+1	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To gain Knowledge of uses and services of Computer Network
2	To enhance Ability to identify types and topologies of network.
3	To gain Understanding of analog and digital transmission of data.
Objective:	
Sl. No.	
1	To deliver comprehensive view of Computer Network.
2	To enable the students to understand the Network Architecture, Network type and topologies
3	To understand the design issues and working of each layer of OSI model.
4	To familiarize with the benefits and issues regarding Network Security.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of basic data communication & network security.
Course Outcome:	
1.	Identify the different components in a Communication System and their respective roles.
2.	Describe the technical issues related to the Networks
3.	Defining the standard model and protocols of networking
4.	Understand the basics of data communication, networking, internet and their importance.

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction	Introduction to communication systems, Data, signal and Transmission: Analog and Digital, Transmission modes, components, Transmission Impairments, Performance criteria of a communication system. Goals of computer Network, Networks: Classification, Components and Topology, categories of network [LAN, MAN,WAN];Internet: brief history, internet today; Protocols and standards; OSI and TCP/IP model.	15	CO1
Module 2: Data link layer	Data link layer: Types of errors, framing [character and bit stuffing], error detection & correction methods; Flow control; Protocols: Stop & wait ARQ Medium access sub layer: Point to point protocol, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: ALOHA, CSMA,FDMA, TDMA, CDMA; Ethernet	15	CO2
Module 3: Network layer & Transport layer:	Network layer: Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, Routing : techniques, static vs. dynamic routing ,Protocols: IP, IPV6. Transport layer: Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, Quality of services [Qos]	15	CO3
Module 4: Application Layer & Physical Layer:	Application Layer DNS, SMTP, FTP, HTTP & WWW; Security: Cryptography [Public, Private Key based], Digital Signature, Firewalls [technology & applications] Physical Layer: Overview of data[analog & digital], signal[analog & digital], transmission [analog & digital] & transmission media [guided & unguided]; Circuit switching: time division & space division switch,TDM bus; Telephone Network	15	CO4
	Total:	60	
Assignments: Based on the curriculum as covered by the subject teacher.			
List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
B. A. Forouzan	Data Communications and Networking		TMH
A. S. Tanenbaum	Computer Networks		Pearson Education/PHI

Reference Books:			
W. Stallings	Data and Computer Communications		PHI/ Pearson Education

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S			S							
CO2	S	S		M	M							
CO3		M		S	M							
CO4		M		M	S							

Name of the Course: BCA	
Subject: Programming with Java	
Course Code: BCA403 and BCA493	Semester: 4 th
Duration: 48 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam:70
Tutorial: 0	Continuous Assessment: 30
Practical: 4	Practical Sessional internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	The point of this course is to give you a vibe the fundamentals of Java programming environment.
2.	You should have some idea of how to work with different data types, operators and conditional operators in Java.
3.	You should have some idea of how to work with string, array, arraylist, file
4.	You will be able to use and design program using there advanced data structures
5.	You will learn to work with object oriented programming constructs in Java
Objective:	
Sl. No.	
1.	To understand the Fundamentals of data types and operators
2.	To understand concepts about conditional statements in Java
3.	To understand and implement string, file, array, arraylist
4.	To understanding about object oriented programming in Java.
Pre-Requisite:	
Sl. No.	
1.	Basics of programming language.
2.	Logic building skills.
Course Outcome:	
1.	Write Java application programs using OOP principles and proper program structuring.
2.	Develop Java program using packages, inheritance and interface. Create Multithreaded programs. Application of Strings.
3.	Write Java programs to implement error handling techniques using exception handling and develop programs using class and inputs from keyboard.
4.	Develop IO and graphical User Interface using AWT. Demonstrate event handling mechanism.

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1 Oops Concept	Object, Class, Data abstraction, Data encapsulation, Inheritance, Polymorphism, Dynamic binding	10	CO1
An overview of Java	Java features, JVM, Comparison between Java and C++, Idea of any Java Development Kit (JDK), learn to run java program through command line and with any JDK		
Data Concept	Data Types, variables, Arrays and constants Tokens in Java (Identifiers, Literals, Keywords, Operator)		
Control Statements	Simple if statement, if...else statement, Nesting of if-else statement, switch statement		
Iteration Statement	For loop, While loop, Do-While loop		
Classes and Objects	Creating main() in a separate class, Methods with parameters, Methods with a return type, Method overloading, Passing Objects as Parameters, Passing Values to methods and Constructor, Abstract classes		
Module 2 Inheritance	Basic concepts, types of inheritance, use of super keyword, overriding methods.	15	CO2
String and String Buffer	Use of different functions		
Packages, Interfaces	User defined package, import package, Class path, How to create interface, use and extend interface		
Multithreaded Programming	Overview, Thread Life cycle, Advantages of multithreading over multi-tasking Thread Creation and simple programs, Synchronized threads, Synchronized Methods		
Module 3 Exception Handling	Overview, What is Exceptions and handling exception?, Compile time errors Run time errors, try...catch, Using Multiple catch Blocks, finally Block, Throwing an Exception, Using the throw and throws Statement.	5	CO3

Module 4 Stream	Byte Streams, Input Stream, Output Stream Character Streams (Reader, Writer), How Files and Streams Work, Working with Reader classes (InputStreamReader, BufferedReader)	10	CO4
Applets	Applet vs. Application, Applet class, Advantages of Applet, Applet Lifecycle My First Applet, Applet tag, How to run applet		
Abstract Window Toolkit :	GUI Components, Interface and Classes of AWT Package, Labels, Buttons, Check Boxes, Radio button, Text Area, Text Field, Scrollbar, Panels, Layout managers, Simple event driven programming with Text Field and Button		
	Total:	40	100

Practical: Programming Lab with Java

Course Code: BCA493

Credit: 2

Skills to be developed:

Intellectual skills:

1. Skill to understand the Java environment and different data types.
2. Knowledge of advanced data structures and their operations in Java.
3. Ability to implement algorithms to perform various operations on data structures in Java

List of Practical:

1. Program using type() function to display different basic data types in Java.
2. Program to input two numbers the find larger / smaller number.
3. Program to input three numbers and find largest and smallest number.
4. Program to determine Armstrong number / palindrome number.
5. Program to display the terms of a Fibonacci series.
6. Program to work with string.
7. Program to find largest / smallest number in a list/tuple.
8. Program to work with dictionary.
9. Program to create class / objects in Java
10. Program to work with class constructors and other elements of OOP in Java.
11. Programs involving NumPy with Pandas and Matplotlib.
12. Practice package installation and other basic application usage.

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Java: The	Herbert Schildt	Eleventh Edition	

Complete Reference			
E Balagurusamy	Programming with JAVA A Primer	Fourth Edition	
Reference Books:			
Core Java An Integrated Approach (Black Book)	Core Java An Integrated Approach (Black Book)	New Edition	
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1.	Computer with moderate configuration		
2.	Java 8 or higher		

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCA403 CO1	M				M							
BCA403 CO2			S									
BCA403 CO3			S									
BCA403 CO4		M		M								

Name of the Course: BCA	
Subject: Web Design: Wireframes to Prototypes	
Course Code: BCAS401	Semester: 4th
Duration: 40 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 2	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	Balance between theoretical knowledge and technical skills
2	Implement ideas into tangible forms from paper to digital
3	Build prototypes of varying degrees of fidelity to capture design concepts and test on users
4	Refining the content structure
Objective:	
Sl. No.	
1	To design a website service at the structural level.
2	To provides an early visual that can be used to review with the client
3	Connect the site's information architecture to its visual design by showing paths between pages.
4	Clarify consistent ways for displaying particular types of information on the user interface.
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of Computer Fundamentals with operating systems and Internet Web Browsing experience
Course Outcome:	
1.	Understand different components in web technology and to know about CGI and CMS.
2.	Develop interactive Web pages using HTML/XHTML.
3.	Present a professional document using Cascaded Style Sheets.
4.	Construct websites for user interactions using JavaScript

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction to Computers and the Internet	The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet, Mail Extensions, The Hypertext Transfer Protocol, Gateway Interface(CGI), Content Management System – Basics	6	CO1
Module 2: Introduction to HTML	Basic Web page design using HTML tag, Background, Image, Formatting Text, Ordered Lists and Unordered Lists, Hyper Link, Table Creation and different table tags, Form Creation, Adding GUI controls like button checkbox in form, Frame Creation and dividing a web page in multiple Frames	20	CO2
Module 3: Introduction to CSS	What is Cascading Style Sheet and why its required, Inline CSS, Internal or Embedded CSS, External CSS, Classes and IDs, Formatting Text, Div Tag, Export External CSS to a web page	8	CO3
Module 4: JavaScript	Introduction to JavaScript, Data types, if-else statement, Array, Loop, Function, Form validation using JavaScript	6	CO4
	Total:	40	
Assignments: Based on the curriculum as covered by the subject teacher.			
List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
P. J. Deitel, H.M. Deitel	Internet & World Wide Web: How To Program	9780132990455	Pearson

[illegible]

**PAPER NAME: ESSENTIAL STUDIES FOR PROFESSIONALS -
IV PAPER CODE: BCA(GS)401
CONTACT HOUR: 1L**

Subject Code: BCA(GS)401	Semester: 4th
Subject Name: ESSENTIAL STUDIES FOR PROFESSIONALS -IV	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of humanities & social science subjects till class 10th standard and knowledge of Economics up to class 11th standard.	

Course Outcomes:

1. To make the students aware of all the nuances of various public sector examinations.
2. To motivate them hone their previously learnt skills necessary for cracking various exams like civil service examination (UPSC and State PSC), Staff Selection Commission, Railway Services and other exams.
3. This part of the syllabus will also expertise them to boost their conversational skills by allowing them to speak on a variety of topics with ease. This raises their confidence level and puts them one step ahead of others in competitive exam sectors.

Course Content:

Module No.	Description
1.	Constitution of Central State Relationship, Emergency, Election System of India
2.	History: Prehistoric Culture, Gupta Dynasty, Protestant Religion- Buddhism and Jainism.
3.	Geography: Mineral and Ores, Agriculture and Irrigation, Multipurpose River Valley Projects.
4.	Economics: Budget, Current Economic Issues- HDI
5.	Current affairs and Static GK: Monthly Current Affairs Magazine

Learning Resources:

Text Books:

1. Indian Constitution- M. Laxmikant
2. Indian Economy-Ramesh Singh
3. Ancient and Medieval India- Poonam Dalal Dahiya
4. Geography of India- Majid Hussain

Reference Books:

1. Current Affairs Magazine of IEM-UEM
2. Lucent GK

**PAPER NAME: SKILL DEVELOPMENT FOR
PROFESSIONALS -IV PAPER CODE: BCA(GS)481
CONTACT HOUR: 1L**

Subject Code: BCA(GS)481	Semester : 4th
Subject Name: SKILL DEVELOPMENT FOR PROFESSIONALS -IV	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of Quantitative Aptitude, Logical Reasoning & Verbal English.	

Course Outcomes:

1. Understand the advance concepts of QUANTITATIVE ABILITY.
2. Understand the advance concepts of LOGICAL REASONING Skills & Introduction to Deductive Reasoning.
3. Acquire satisfactory competency in use of VERBAL REASONING.
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability.
5. Solve various competitive exams papers like Bank, IBPS, SSC, UPSC, CAT etc

Course Content

Module No.	Description
1.	1) Permutation & Combination. 2) Probability- basic concepts of probability, different theorems & applications, binomial, poisson & normal Distributions. 3) Geometry- Concept of different shapes like triangle, quadrilateral, rectangle, square, circle etc. different theorems & their applications. 4) Mensuration- Formulae on triangles, square, Rhombus, parallelogram, sphere, circle, cone, pyramid etc. Application based problem solving. Coordinate Geometry- Locus, Straight lines, Circle etc.
2.	1) Seating Arrangement a) Circular seating arrangement b) Square seating Arrangement c) Line Arrangement 2) Calendar And Clock 3) Miscellaneous Problems
3.	1) Sentence Corrections 2) Fill the blanks with appropriate words/articles/preposition/verbs/adverbs/conjunction. 6 3) Reading Comprehension (Advance Level) 4) Vocabulary Newspaper reading: The Hindu & Economic Times.

Learning Resources:

Text Books:

1. Objective General English- S.P Bakshi
2. English Grammar and Competition-S.C Gupta
3. Fast Track Objective Arithmetic- Rajesh Verma

4. Quantitative Aptitude– S.Chand

Reference Books:

1. Advance Maths- Rakesh Yadav
2. Verbal and Non-Verbal Reasoning- R.S Agarwal
- 3.A new approach to Reasoning- BS Sijwali

Name of the Course: BCA	
Subject: Business Communication	
Course Code: BCAN 481	Semester: 4th
Duration: 35 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 0	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 2	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	Ability to read English with understanding and decipher paragraph patterns ,writing techniques and conclusions.
2	Skill to develop the ability to write English correctly and master the mechanics of writing the use of correct punctuation marks and capital letters.
3	Ability to understand English when spoken in various contexts.
Objective:	
Sl. No.	
1	To provide an outline to effective Organizational Communication.
2	To impart the correct practices of the strategies of Effective Business writing.
3	To use R,W,L,S and integrate the use of four language skills, reading, writing, listening & speaking
4	To underline the nuances of Business communication.
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge about Spoken English and writing techniques

Course Outcome:			
1.	Students will be able to understand and evaluate key theoretical approaches used in the interdisciplinary field of communication. I.e., students will be able to explain major theoretical frameworks, constructs, and concepts for the study of communication and language.		
2.	Students will be able to understand the methods associated with the study of human communication, and apply those approaches to the analysis and evaluation of human communication.		
3.	Students will develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others. Such skills include communication competencies such as managing conflict, active listening, appropriate self-disclosure, etc.		
4.	Students will be able to communicate effectively orally and in writing.		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
MODULE 1: BASICS OF COMMUNICATION & IT'S FORMS	Introduction – Meaning & Definition, Models, Elements, Effective Communication, One way & two way communication, Formal & Informal Communication, Verbal & Non-Verbal Communication	10	CO1
MODULE 2: AUDIENCE ANALYSIS & SWOT	Introduction, Types of Audience, Importance, What is self-development? Objectives Self- Development through SWOT	7	CO2
MODULE 3: WRITING & READING SKILLS	Letter, Memo, Notice, Report, Email etiquette, Reading Comprehension	14	CO3
MODULE 4: NON – VERBAL COMMUNICATION	C's of Communication process, Kinesics, Proxemics, Paralanguage	4	CO4
	Total:	35	
Assignments: Based on the curriculum as being covered by the subject teacher.			
List of Books			
Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Varinder Kumar	Business Communication	2 nd Edition	Kalyani Publication

Reference Books:			
Chaturvedi & Chaturvedi	Business Communication	7 th Edition	Pearson

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCAN481 CO1												M
BCAN481 CO2									S			
BCAN481 CO3										S		
BCAN481 CO4								M				

Semester V							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC11	BCA501 BCA591	Unix and Shell programming Unix and Shell programming Lab	4	0	4	6
2	CC12	BCA502	Software Engineering	5	1	0	6
3	DSE-1	BCAD501	A. Cyber Security B. Design & Analysis of Algorithm C. Information & Coding Theory D. Theory of Computation E. Combinatorial Optimization	4 / 5	0 / 1	4 / 0	6
4	DSE-2	BCAD581	Industrial Training & Minor Project	4	0	4	6
Non-Credit Industry Value Added Course							
5	NIVAC14	BCA(GS)501	Essential Studies For Professionals - V	1	0	0	2
6	NIVAC15	BCA(GS)581	Skill Development For Professionals - V	1	0	0	1
7	NIVAC16	BCAN-581	Numerical and statistical Methods	2	0	0	1
8	NIVAC17	BCAN-582	Industrial Training	1	0	0	1
9	NIVAC18	MC581	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				30

Name of the Course: BCA			
Subject: Unix and Shell Programming			
Course Code: BCA501 and BCA591		Semester: 5	
Duration: 44 Hrs.		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 4		End Semester Exam:70	
Tutorial: 0		Attendance: 5	
Practical: 4		Continuous Assessment: 30	
Credit: 4+2		Practical Sessional internal continuous evaluation: 40	
		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1.	The aim is to make students aware of multi user operating system environment		
2.	The aim is to make students get familiar with CUI based command and Editors		
3.	The aim is to make student get familiar with Shell programming		
Objective:			
Sl. No.			
1	Students should develop an understanding of CUI commands and multi user environment		
2	Students should develop an understanding of files, attributes, process, and filters.		
3	Students should develop an understanding of Shell programming, system administrative commands.		
Pre-Requisite:			
Sl. No.			
1.	Knowledge of operating the computer system		
2.	NA		
Course Outcome			
1. Understand the various concepts of UNIX and UNIX like operating systems.			
2. Run basic commands to control the Unix like environment.			
3. Applying shell programming skills to solve problems.			
4. Acquire the knowledge of system administration and security of OS.			
Contents			
Module	Serial of Modules	Hours	CO Mapping

Module-1		10	CO1
Getting Started	The Operating System, The UNIX Operating System, Knowing your machine, A brief session, Conclusion		
General Purpose Utilities	cal : The calendar, date : Displaying the system date, echo : Displaying the message, bc : The calculator, passwd : changing your password, who : who are the users, uname : knowing your machines characteristics, tty : knowing your terminal.		
The File System	,The File, What's in a (File) Name, The Parent-Child relationship, The HOME variable: the home directory., pwd : checking your current directory, cd : changing the current directory, mkdir : making directories, rmdir : removing directories, Absolute pathnames, Relative pathnames, ls : listing directory contents, The UNIX file system		
Handling Ordinary Files	cat : Displaying and creating files, cp : Copying a file, rm : Deleting files, mv : Renaming files, more : Paging output, file : Knowing the file types, wc : Counting lines, words and characters, cmp : Comparing two files, gzip and gunzip : Compressing and Decompressing files, tar : The archival program		
Basic File Attributes	ls -l : Listing file attributes, File ownership, File permissions, chmod : Changing file permission, Directory permissions, Changing file ownership, Conclusion		
Module-2		10	CO2
The Shell	The Shell's interpretive cycle, Pattern matching the wild card, Escaping and Quoting, /dev/null and /dev/tty: Two special files		
The Process	Process basics, ps: process status, Mechanism of Process Creation, Internal and External Command, Running Jobs in Background		
More File Attributes	File Systems and Inodes, Hard links, Symbolic links and ln		

Module-3 Simple Filters	The Sample Database, pr: paginating Files, head: Displaying the Beginning of a File, tail: Displaying the End of a File, cut: Slitting a File Vertically, paste: Pasting Files, sort: Ordering a File, uniq: Locate Repeated and Nonrepeated Lines, tr: Translating Characters	10	CO3
Filters using Regular Expressions- grep and sed	grep: Searching for a Patter, Basic Regular Expression, Extended Regular Expression (ERE) and egrep, sed: The Stream Editor, Line Addressing, Using Multiple Instructions (-e and -f), Context Addressing, Writing Selected Lines to a File (w)		
Module-4 Essential Shell Programming	Shell Scripts, read: Making Scripts Interactive, The Logical Operators && and , the if Condition, Using test and [] to Evaluate Expressions, The case Condition, expr, While, for	10	CO4
Essential System Administration	root: The system administrator's login, The administrator's privileges, Maintaining security, User management, Startup and shutdown, Managing Disk Space, Device files, cpio, tar		
awk-An advanced filter	Simple awk filtering.		
	Sub Total:	40	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	44	100

Practical: (Unix and Shell Programming Lab)

Skills to be developed:

Intellectual skills:

1. Skill to work on different unix/linux based commands.
2. Knowledge of advanced administrative command and perform intermediate level shell programming.

List of Practical:

1. Calendar, Display system date, Message display, Calculator, Password changing, Knowing who are logged in, Knowing System information
2. Displaying pathname of the current directory (pwd), Changing the current directory (cd), Make directory(mkdir), Remove directories (rmdir), Listing contents of directory (ls and its options), Absolute pathname, Relative pathname, Using dot (.) and dotdot (..)
6. Displaying and creating files, Copying a file, Deleting a file, Renaming/ moving a file, Paging output, Knowing file type, Line, word and character counting (wc), Comparing files, Finding common between two files, Displaying file differences
7. File and directory attributes listing, File ownership, File permissions, Changing file permissions – relative permission & absolute permission, Changing file ownership, Changing group ownership, File system and inodes, Hard link, Soft link, Default permissions of file and directory and using umask, Listing of modification and access time, Time stamp changing, File locating

8. Types of shell, Pattern matching, Escaping, Quoting, Redirection, Pipe, tee, Command substitution, Shell variables
9. Display process attributes, Display System processes, Background jobs, Reduce priority, Sending job to background and foreground, Listing jobs
10. Prepare file for printing, Custom display of file using head and tail, Vertical division of file, Paste files, Sort file, Finding repetition and non- repetition, Manipulating characters using, Searching pattern
11. Introduction to VI/VIM editor, Different commands of the editor, File editing in the editor
12. Simple shell scripts, Interactive shell script, Using command line arguments, Logical operator (&&, ||), Condition checking (if-then, if-then-else-fi, if-then—elif-else-fi, case), Expression evaluation (test, []), Computation (expr), Using expr for strings, Loop (while, for, until, continue), Use of positional parameters
13. Simple implementation of basic LINUX commands, utilities, filters etc. using shell scripts

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Sumitava Das	UNIX-Concepts & Applications		TMH
Peek	Learning UNIX Operating System		SPD/O'REILLY

Reference Books:

Srirengan	Understanding UNIX		PHI
-----------	--------------------	--	-----

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer with moderate configuration
2.	Unix/Linux OS and other softwares as required.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		S	M									
CO3			S									
CO4	M			S								

Name of the Course: BCA	
Subject: Software Engineering	
Course Code: BCA502	Semester: 5th
Duration: 58 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 6	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	Familiarization with the concept of software engineering and its relevance.
2	Understanding of various methods or models for developing a software product.
3	Ability to analyze existing system to gather requirements for proposed system.
4	Gain skill to design and develop software.
Objective:	
Sl. No.	
1	To introduce the students to a branch of study associated with the development of a software product.
2	To gain basic knowledge about the pre-requisites for planning a software project.
3	To learn how to design of software
4	To enable the students to perform testing of a software.
Pre-Requisite:	
Sl. No.	
1.	None
Course Outcome:	
1.	To identify software requirements for manual or automated real-world systems
2.	To compare and contrast software process models and software development methodologies.

3.	To illustrate the software requirement specification, and system design.		
4.	To develop ability to critically analyze and evaluate a variety of management practices in the contemporary context.		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Fundamentals of Software Engineering	Evolution—From an Art Form to an Engineering Discipline, Software Development Projects, Exploratory Style of Software Development, Emergence of Software Engineering, Notable Changes in Software Development Practices, Computer Systems Engineering, A Few Basic Concepts, Waterfall Model and its Extensions, Rapid Application Development (RAD), Agile Development Models, Spiral Model, A Comparison of Different Life Cycle Models	20	CO1, CO2
Module 2: Software Project Management	Software Project Management Complexities, Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO—A Heuristic Estimation Technique, Halstead's Software Science—An Analytical Technique, Staffing Level Estimation, Scheduling, Organisation and Team Structures, Staffing, Risk Management, Software Configuration Management, Requirements Gathering and Analysis, Software Requirements Specification (SRS), Formal System Specification, Axiomatic Specification, Algebraic Specification, Executable Specification and 4GL	20	CO3, CO4,
Module 3: Software Design	Overview of the Design Process, How to Characterise a Good Software Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design, Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review	15	CO3
Module 4: Software Reliability and Quality Management	Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model, Few Other Important Quality Standards, Six Sigma, Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, Estimation of Maintenance Cost	5	CO1, CO4
	Total:	58	
Assignments: Based on the curriculum as covered by the subject teacher.			
List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Rajib Mall	Fundamentals of Software Engineerng	Fourth Edition	Prentice Hall India Learning Private Limited
Abhishek Bhattacharya &	Software Project Management And	First Edition	SPS Education India Pvt. Ltd

Tanusree Chatterjee	Quality Assurance		
Reference Books:			
Roger S. Pressman	Software Engineering: A Practitioner's Approach (Mcgraw-Hill Series in Computer Science)	Fifth Edition	McGraw Hill Higher Education

CO & PO Mapping:

[illegible]

Name of the Course: BCA	
Subject: Cyber Security	
Course Code: BCAD501	Semester: 5th
Duration: 60 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 5+1	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	This course is aimed at giving basic understanding about the Cyber Security
2	This course is aimed at providing knowledge about cyber threats, attacks and cyber laws.
3	This course is aimed at familiarizing the concepts of malware, hacking and ways to safeguard your system.
Objective:	
Sl. No.	
1	Develop an overall understanding of defending data in cyberspace
2	Develop an understanding of different protocols, cyber crimes, cyber laws and vulnerabilities in digital world.
3	Develop an understanding of how to stay secure amidst cyber threats and malware attacks.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of basic data communication & network security.
Course Outcome:	
1.	Understand the various concepts of underlying computer network and probable threats
2.	Apply these techniques in applications to see the real-life security mechanisms in the cyber world.
3.	Explain the role of anti-malware programs in combating cyber threats.
4.	Acquire the basic knowledge of real-world hacking.

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Network Layer and Application Layer	IPv4 Addresses, IPv6 Addresses, Network layer: Delivery, Forwarding and Delivery, Delivery, forwarding, unicast routing protocols, multicast routing protocols, Remote logging, electronic mail and file transfer, Remote logging, Electronic mail, File transfer, WWW and HTTP	15	CO1
Module 2: Cryptography and Network Security	Cryptography, Symmetric Key cryptography, Asymmetric Key cryptography, Network Security, Security Service :Message Confidentiality, Message Integrity, Message Authentication, Digital Signature, Entity Authentication, Key Management	15	CO2
Module 3: Introduction to Cyber Security	Information Security: What is Security? Why Information Security is Important? Threats to Information systems, Security Threat Source, Internal threats, External Threats, Cyber Security and Security risk analysis Application Security: Database security, E-mail Security Internet Security Security Threats Virus, Worms, Trojan Horse, Bombs, Trap Door E-mail spoofing E-mail Virus, Virus Life-Cycle, How Virus Works? Macro Viruses, Malicious Software, Network and Services Attack Denial-of-Service Attack, Types of DOS Attacks Methods of attacks.	15	CO3
Module 4: Information Security Standards	What is ISO?, IT Act 2000 Copyright, Patent, Intellectual Property Rights Cyber Laws in India, Software Licensing Introduction to Ethical Hacking Ethics Terminology, The Ethical Hacker, Security and Hacking Foundation of Security – C.A.I.A, Phases of Ethical Hacking, Hacking Technologies, Phase of Ethical Hacking: Reconnaissance, Scanning, Gaining Access Maintaining Access Covering Tracks, Hacker Classes: Black Hats, White Hats, Gray Hats	15	CO4
	Total:	60	

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Behrouz A. Forouzan.	Data Communications & Networking	4th Edition	Tata McGraw-Hill
Mayank Bhushan	Fundamentals of Cyber Security	NA	BPB Publications.
Reference Books:			
William Manning.	Certified Ethical Hacker Certification Exam	ISBN: 9781447611059, 9781447611059	Lulu.com

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S			S							
CO2	S	S		M	M							
CO3		M		S	M							
CO4		M		M	S							

Name of the Course: BCA			
Subject: Design and Analysis of Algorithms			
Course Code: BCAD501B and BCAD591B		Semester: 5th	
Duration: 48 Hours		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 4		End Semester Exam: 70	
Tutorial: 0		Continuous Assessment: 30	
Practical: 4		Practical Sessional internal continuous evaluation: 40	
Credit: 4 + 2		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1	To gain knowledge of algorithm complexity analysis.		
2	To understand and apply several algorithm design strategies.		
Objective:			
Sl. No.			
1	To be familiar with algorithm complexity analysis.		
2	To understand and apply several algorithm design strategies.		
Pre-Requisite:			
Sl. No.			
1.	Basic knowledge of mathematics.		
2.	Basic Knowledge of programming.		
Contents			
Chapter	Name of the Topic	Hours	Marks
01	Complexity Analysis Time and Space Complexity, Different Asymptotic notations big O,Ω,Ø , Little o,,ω and their mathematical significance and proof.	8	10
02	Algorithm Design by Divide and Conquer Basic concept of divide and conquer, Merge sort, Quick sort ,heap sort and their complexity analysis in best case, worst case and average case.	8	15
03	Disjoint Set Data Structure Set Manipulation Algorithm by Union-Find, Union by Rank, Path Compression	8	10
04	Algorithm Design by Greedy Strategy Basic concept, Activity Selection Problem, Fractional Knapsack problem, Job sequencing with deadline,Prims, Kruskal.	6	10
05	Algorithm Design by Dynamic Programming Basic concept, 0/1 Knapsack Problem, Matrix Chain Multiplication, All Pair Shortest Path - Floyd Warshall Algorithm, Dijkstra's.	6	15
06	Algorithm Design by Backtracking Basic concept, Use - N-Queen Problem, Graph Coloring Problem, Hamiltonian Path Problem	8	10

	Sub Total:	44	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	48	100

Practical

Course Code:

BCA493 Credit: 2

Skills to be developed:

Intellectual skills:

1. Skill to analyze algorithms and to determine algorithm correctness and their time efficiency.
2. Knowledge of advanced abstract data type (ADT) and data structures and their implementations.
3. Ability to implement algorithms to perform various operations on data structures.

List of Practical:

1. Implement Merge sort, Implement Quicksort.
2. Find maximum and minimum elements from an array of integers using divide and conquer strategy.
3. Implement fractional knapsack,

4. Implement Job sequence with deadline
5. Implement Dijkstra's algorithm,
6. Implement Prim's algorithm
7. Implement Kruskal's algorithm.
8. Implement Matrix Chain Multiplication
9. Implement Floyd Warshall Algorithm
10. Implement Dijkstra's Algorithm

Assignments:

Based on the curriculum as covered by subject teacher.

List of Books Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
E.Horowitz and Sahni	Fundamentals of Computer Algorithms		
T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein	Introduction to Algorithms		

Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1	Computer with moderate configuration
2	Softwares as required.

Name of the Course: BCA			
Subject: Information and Coding Theory			
Course Code: BCAD501C		Semester: 5 th	
Duration: 60 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial: 1		Continuous Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation: NA	
Credit: 6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1	Introduced to the basic notions of information and channel capacity.		
2	To introduce information theory, the fundamentals of error control coding techniques and their applications, and basic cryptography.		
3	To provide a complementary U/G physical layer communication		
	to convolutional and block codes, decoding techniques, and automatic repeat request (ARQ) schemes.		
Objective:			
Sl. No.			
1	Understand how error control coding techniques are applied in communication systems.		
2	Able to understand the basic concepts of cryptography.		
3	To enhance knowledge of probabilities, entropy, measures of information.		
Pre-Requisite:			
Sl. No.			
1.	Probability and Statistics		
Contents			3 Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	INFORMATION ENTROPY FUNDAMENTALS Uncertainty, Information and Entropy – Source coding Theorem – Huffman coding –Shannon Fano coding – Discrete Memory less channels – channel capacity – channel coding Theorem – Channel capacity Theorem.	20	23

02	DATA AND VOICE CODING Differential Pulse code Modulation – Adaptive Differential Pulse Code Modulation – Adaptive subband coding – Delta Modulation – Adaptive Delta Modulation – Coding of speech signal at low bit rates (Vocoders, LPC). Denial of Service Attacks, DOS-proof network architecture, Security architecture of World Wide Web, Security Architecture of Web Servers, and Web Clients, Web Application Security – Cross Site Scripting Attacks, Cross Site Request Forgery, SQL Injection Attacks, Content Security Policies (CSP) in web, Session Management and User Authentication, Session Integrity, Https, SSL/TLS, Threat Modeling, Attack Surfaces, and other comprehensive approaches to network design for security	20	24
03	ERROR CONTROL CODING Linear Block codes – Syndrome Decoding – Minimum distance consideration – cyclic codes – Generator Polynomial – Parity check polynomial – Encoder for cyclic codes – calculation of syndrome – Convolutional codes.	16	23
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100
List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Simon Haykin	Communication Systems	4th Edition	John Wiley and Sons, 2001
Fred Halsall	Multimedia Communications, Applications Networks Protocols and Standards		Pearson Education, Asia 2002
Reference Books:			
Mark Nelson	Data Compression Book		Publication 1992
Watkinson J	Compression in Video and Audio		Focal Press, London, 1995

Name of the Course: BCA			
Subject: Theory of Computation			
Course Code: BCAD501D		Semester: 5th	
Duration: 60 Hours		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial: 1		Continuous Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation: NA	
Credit: 6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1	To gain knowledge of automata theory.		
2	To understand the theoretical computer science.		
Objective:			
Sl. No.			
1	Study various types of finite automata.		
2	Understand the challenge of theoretical computer science and it's application.		
Pre-Requisite:			
Sl. No.	None		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Languages Alphabets, string, language, Basic Operations on language, Concatenation, KleeneStar	11	10
02	Finite Automata and Regular Languages Regular Expressions, Transition Graphs, Deterministics and non-deterministic finite automata, NFA to DFA Conversion, Regular languages and their relationship with finite automata, Pumping lemma and closure properties of regular languages.	15	20
03	Context free languages Context free grammars, parse trees, ambiguities in grammar and languages, Pushdown automata (Deterministic and Non-deterministic), Pumping Lemma, Properties of context free languages, normal forms.	15	20
04	Turing Machines and Models of Computation RAM, Turing Machine as a model of computation, Universal Turing	15	20
	Machine, Language acceptability, decidability, halting problem, Recursively enumerable and recursive languages, unsolvability problems.		
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100
Assignments: Based on the curriculum as covered by subject teacher.			
List of Books Text Books:			

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Daniel I.A.Cohen	Introduction to computer theory	8th Edition	John Wiley Publications
Lewis & Papadimitriou	Elements of the theory of computation		PHI
Hopcroft, Aho, Ullman	Introduction to Automata theory, Language & Computation	3 rd Edition	Pearson Education
Reference Books:			
P. Linz	An Introduction to Formal Language and Automata	4th edition	Publication Jones Bartlett

Name of the Course: BCA			
Subject: Combinatorial Optimization			
Course Code: BCAD501E		Semester: 5th	
Duration: 60 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial: 1		Continuous Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation: NA	
Credit: 6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	To Understand Combinatorial Optimization problems		
Pre-Requisite:			
Sl. No.			
	None		
Contents			6 Hrs./week
Chapter	Name of the Topic	Hours	Marks
1	Introduction to combinatorial optimization. Matrix multiplication Knapsack problem Tardos, Prof. Ranade's lecture Bipartite matching problem	12	14
2	Introduction to Linear algebra - Vectors, matrices, row view, column view, matrix multiplication, special matrices: square, symmetric, identity. Inverse of a matrix Row/Column space, rank, orthogonal vectors, null space, fundamental theorem of linear algebra	12	14
3	Introduction to Linear programming - diet problem example, the LP problem, 2-D geometric view and finding min and max Different LP problems. Feasible solution, basic feasible solution (bfs)	12	14
4	Existence of basic feasible solution Affine set, affine combination of points, Convex sets - examples, closure properties, Convex Hull of a set	12	14
5	Traversing from one bfs to another bfs Finding an initial bfs, The simplex algorithm, Proof of correctness	8	14
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100
List of Books			
Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Vangelis Th. Paschos	Concepts of Combinatorial Optimization	2nd Edition	Wiley

Name of the Course: BCA		
Subject: Industrial Training & Minor Project		
Course Code: BCAD581	Semester: 5	
Duration: 4/6 weeks	Maximum Marks: 100	
Teaching Scheme	Examination Scheme	
Theory: 4	End Semester Exam: 100	
Tutorial: 0	Attendance: NA	
Practical: 4	Continuous Assessment: NA	
Credit: 4+2	Sessional internal continuous evaluation: 0	
	Sessional internal examination: 100	
Aim:		
Sl. No.		
1	To develop industrial understanding.	
2	To develop understanding of project management.	
3	To cope up with industry oriented real time project environment.	
Objective:		
Sl. No.		
1	To develop team work.	
2	To develop understanding of project management.	
3	To be able to implement real life software or <u>hardware based</u> projects.	
Pre-Requisite:		
Sl. No.		
1.	None	
Practical/ Sessional Examination: Examiner-		
Industrial Visit Certificate	30	
Minor Project Demo/ Q&A	50	
Overall Viva Voce	20	100

PAPER NAME: ESSENTIAL STUDIES FOR PROFESSIONALS -
VPAPER CODE: BCA(GS)501
CONTACT HOUR: 1L

Subject Code: BCA(GS)501	Semester: 5th
Subject Name: ESSENTIAL STUDIES FOR PROFESSIONALS	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of humanities & social science subjects till class 10th standard and knowledge of Economics up to class 11th standard.	

Course Outcomes:

1. The student will be able to polish and enhance various aptitude skills and cognitive knowledge.
2. The student will be able to prepare them to be successful in the fields in respect to different competitive examinations like GATE, CAT, MAT, GMAT, UPSC, WBCS, Banking services, Indian Defence Services, Combined Graduate Level etc.
3. The student will be able to train themselves not only for private sectors but also for public sectors (PSU) to secure a fulfilling career.
4. To use logical notation & Perform logical proofs, recursive functions and solve recurrence relations and principles of counting

Course Content:

Module No.	Description
1.	Constitution of India: Constitutional Amendments, Parliament
2.	History: Development of Education, Development of Press in India, Revolt of 1857.
3.	Geography: Census, Political Geography of India, Power Projects of India.
4.	Economics: Monetary Policy of RBI, Inflation and Deflation.
5.	Current affairs and Static GK: Monthly Current Affairs Magazine

Learning Resources:

Text Books:

1. Indian Constitution- M. Laxmikant
2. Indian Economy-Ramesh Singh
3. History of Modern India- Bepan Chandra
4. Geography of India- Majid Hussain

Reference Books:

1. Current Affairs Magazine of IEM-UEM
2. Lucent GK

PAPER NAME: SKILL DEVELOPMENT FOR PROFESSIONALS
-VPAPER CODE: BCA(GS)581
CONTACT HOUR: 1L

Subject Code: BCA(GS)581	Semester: 5th
Subject Name: SKILL DEVELOPMENT FOR PROFESSIONALS V	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of Quantitative Aptitude, Logical Reasoning & Verbal English.	

Course Outcomes:

1. The ability to communicate effectively with a range of audiences.
2. The ability to face the test and interview conducted by different companies and succeed
3. The ability to recognize the need for continuing professional development.
4. The ability to succeed in competitive exams (GATE / GRE / PSU's/Placement Aptitude etc.).

Course Content

Module No.	Description
1.	Quantitative Aptitude & Data Interpretation- Miscellaneous
2.	Logical Reasoning 1) Statement And Assumption, 2) Statement And Conclusion, 3) Statement And Course Of Action, 4) Cause And Effect, 5) Drawing Inference
3.	1) Sentence Corrections 2) Fill the blanks with appropriate words/articles/preposition/verbs/adverbs/conjunction. 3) Reading Comprehension (Advance Level) 4) Vocabulary Newspaper reading: The Hindu & Economic Times.

Learning Resources:

Text Books:

1. Objective General English- S.P Bakshi
2. English Grammar and Competition-S.C Gupta
3. Fast Track Objective Arithmetic- Rajesh Verma
4. Quantitative Aptitude– S.Chand

Reference Books:

1. Advance Maths- Rakesh Yadav
2. Verbal and Non-Verbal Reasoning- R.S Agarwal
3. A new approach to Reasoning- BS Sijwali

Name of the Course: BCA	
Subject: Numerical and Statistical Methods	
Course Code: BCAN-581	Semester: 5th
Duration: 38 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 0	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 0	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	Studying the numerical methods for solving problems, mastering of methodological approaches of numerical calculations development.
2	Studying the methods for solving research and applied tasks.
3	Studying of the problem solving methods based on the application.
Objective:	
Sl. No.	
1	To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
2	To facilitate numerical computing.
3	To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
4	To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of calculus, algebra and formulation of algorithms.
Course Outcome:	
1.	Students would be able to assess the approximation techniques to formulate and apply appropriate strategy to solve real world problems. Students will be able to find solutions of algebraic and differential equations.

2.	Students will be able to explain and measure errors in numerical computations.		
3.	Students will be able to find solutions of interpolation problems.		
4.	Students will be able to solve numerical integration problems using different techniques. Students will be able to derive solution for a system of linear equations.		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Error Estimation Interpolation With Equal and Unequal Intervals	Approximation in numerical computation, Truncation and rounding errors. Lagrange’s Interpolation, Newton forward and backward differences interpolation, Newton divided Difference.	11	CO1, CO2, CO3
Module 2: Solution of Algebraic and Transcendental Equations	Bisection method, Secant method, Regula–Falsi method, Newton Raphson method, Method of Iteration.	9	CO1
Module 3: System of Linear Algebraic Equations Numerical Integration	Gauss elimination method, Matrix inversion, LU factorization method, Gauss-Jacobi method, Gauss Seidel method. Trapezoidal rule, Simpson 1/3 rule, Weddle’s rule.	7	CO4
Module 4: Numerical Solution of Ordinary Differential Equation of First Order	Taylor’s series method, Euler’s method, Runga–kutta method, Predictor – correction method.	11	CO1
	Total:	38	
Assignments: Based on the curriculum as covered by the subject teacher.			
List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
S Kalavathy M Joice Punitha	Numerical Methods	2 nd Edition	Tata McGraw Hill
S A Mollah	Numerical Analysis and Computational Procedures	4 th Edition	Books & Allied(P) Ltd.
Reference Books:			

Sastry S S	Introductory Methods of Numerical Analysis	3 rd Edition	Prentice Hall India Learning Private Limited
------------	--	-------------------------	--

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCAN-581 CO1	S	M										
BCAN-581 CO2	S			M								
BCAN-581 CO3		S		M								
BCAN-581 CO4	M	M	S	M								

Semester VI							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	CC13	BCA601	Soft Computing	5	1	0	6
2	CC14	BCA602	Cloud Computing	5	1	0	6
3	DSE-3	BCAD601	A. Internet of Things B. Digital Image Processing C. Information Security D. Advanced Database and PL/SQL E. GUI Programming with .NET	4 / 5	0 / 1	4 / 0	6
4	DSE-4	BCAD681	Major Project & Grand Viva	4	0	4	6
Non-Credit Industry Value Added Course							
5	NIVAC19	BCA(GS)601	Essential Studies For Professionals - VI	1	0	0	2
6	NIVAC20	BCA(GS)681	Skill Development For Professionals - VI	1	0	0	1
7	NIVAC21	BCAN-681	Automata & Natural Language Processing	2	0	0	1
8	NIVAC22	MC681	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)				1
			Total Credit				29

Name of the Course: BCA	
Subject: Soft Computing	
Course Code: BCA601	Semester: 6th
Duration: 60 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 5+1	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	Enumerate the theoretical basis of soft computing
2	Explain the fuzzy set theory
3	Discuss the neural networks and supervised and unsupervised learning networks
4	Demonstrate some applications of computational intelligence
5	Apply the most appropriate soft computing algorithm for a given situation
Objective:	
Sl. No.	
1	Enumerate the strengths and weakness of soft computing
2	Illustrate soft computing methods with other logic driven and statistical method driven approaches
3	Focus on the basics of neural networks, fuzzy systems, and evolutionary computing
4	Emphasize the role of euro-fuzzy and hybrid modeling methods
5	Trace the basis and need for evolutionary computing and relate it with other soft computing approaches
Pre-Requisite:	
Sl. No.	
1.	Mathematical knowledge

Course Outcome:			
1.	Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.		
2.	Apply these techniques in applications which involve perception, reasoning and learning		
3.	Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals		
4.	Acquire the knowledge of real world Knowledge representation.		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction	Introduction: Introduction to soft computing; introduction to fuzzy sets and fuzzy logic systems; introduction to biological and artificial neural network; introduction to Genetic Algorithm.	15	CO1
Module 2: Fuzzy sets and Fuzzy logic systems:	<p>Fuzzy sets and Fuzzy logic systems:</p> <p>Classical Sets and Fuzzy Sets and Fuzzy relations : Operations on Classical sets, properties of classical sets, Fuzzy set operations, properties of fuzzy sets, cardinality, operations, and properties of fuzzy relations.</p> <p>Membership functions : Features of membership functions, standard forms and boundaries, different fuzzification methods.</p> <p>Fuzzy to Crisp conversions: Lambda Cuts for fuzzy sets, fuzzy Relations, Defuzzification methods.</p> <p>Classical Logic and Fuzzy Logic: Classical predicate logic, Fuzzy Logic, Approximate reasoning and Fuzzy Implication</p> <p>Fuzzy Rule based Systems: Linguistic Hedges, Fuzzy Rule based system – Aggregation of fuzzy Rules, Fuzzy Inference System- Mamdani Fuzzy Models – Sugeno Fuzzy Models.</p> <p>Applications of Fuzzy Logic: How Fuzzy Logic is applied in Home Appliances, General Fuzzy Logic controllers, Basic Medical Diagnostic systems and Weather forecasting</p>	15	CO2
Module 3: Neural Network	<p>Neural Network</p> <p>Introduction to Neural Networks: Advent of Modern Neuroscience, Classical AI and Neural Networks, Biological Neurons and Artificial neural network; model of artificial neuron.</p> <p>Learning Methods : Hebbian, competitive, Boltzman etc.,</p> <p>Neural Network models: Perceptron, Adaline and Madaline networks; single layer network; Back-propagation and</p>	15	CO3

	multilayer networks. Competitive learning networks: Kohonenself organizing networks, Hebbian learning; Hopfield Networks. Neuro-Fuzzy modelling: Applications of Neural Networks: Pattern Recognition and classification		
Module 4: Genetic Algorithms	Genetic Algorithms: Simple GA, crossover and mutation, Multi- objective Genetic Algorithm (MOGA). Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition, Other Soft Computing techniques: Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).	15	CO4
	Total:	60	

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Timothy J. Ross	Fuzzy logic with engineering applications		John Wiley and Sons.
S. Rajasekaran and G.A.V.Pai,	Neural Networks, Fuzzy Logic and Genetic Algorithms		PHI

Reference Books:

S N Sivanandam, S. Sumathi	Principles of Soft Computing		John Wiley & Sons
David E. Goldberg	Genetic Algorithms in search, Optimization & Machine Learning		Pearson/PHI
Samir Roy & Udit	A beginners approach		Pearson
Kumar Satish	Neural Networks: A Classroom Approach,1/e		TMH

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		S	M									
CO3			S									
CO4	M			S								

Name of the Course: BCA	
Subject: Cloud Computing	
Course Code: BCA602	Semester: 6th
Duration: 60 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 6	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To gain knowledge of cloud computing.
2	To gain knowledge of several application areas of cloud computing.
3	To understand cloud computing platforms.
Objective:	
Sl. No.	
1	Understand the principles of cloud computing.
2	Understanding SaaS, PaaS etc.
3	To gain knowledge of applications of cloud computing.
Pre-Requisite:	
Sl. No.	
1.	Basics of Computer fundamentals and networking.
Course Outcome:	
1.	Understand the fundamentals and foundations of Cloud Computing.
2.	Idea about the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
3.	Understand the key concepts of virtualization and use of hypervisors, explain the core issues of cloud computing such as security, privacy, etc.
4.	Gain knowledge about the different Cloud computing services and cloud service providers, Gain knowledge about cloud servers and cloud storage technologies, relevant distributed file systems, NoSQL databases and object storage

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction and Historical developments	Cloud Computing at a Glance ,The Vision of Cloud Computing ,Defining a Cloud ,Cloud Computing Reference Model ,Characteristics and Benefits ,Historical Developments ,Distributed Systems ,Virtualization ,Web 2.0 ,Service Oriented Computing ,Utility Oriented Computing ,Eras of Computing ,Parallel vs Distributed Computing ,Elements of Parallel Computing ,What is Parallel Processing ,Hardware Architectures of Parallel Processing ,Approaches to Parallel Programming ,Levels of Parallelism ,Laws of Caution ,Elements of Distributed Computing ,Architectural Styles for Distributed Computing ,Models for Inter Process Communication ,Technologies for Distributed Computing ,Remote Procedure Call ,Distributed Object Framework ,Service Oriented Computing	16	CO1,CO 2
Module 2: Virtualization	The Introduction ,Characteristic of Virtualized Environments ,Execution Virtualization ,Other types of Virtualization ,Virtualization and Cloud Computing ,Pros and Cons of Virtualization ,IAAS, PAAS, SAAS Types of Clouds and Security	14	CO2,CO 3,CO4
Module 3: Principles of Parallel and Distributed Computing -Part 1	Concurrent Computing with Thread Programming ,High-throughput Computing and Data-Intensive Computing ,Programming applications with Threads ,Thread API, Parallel computation with Threads, Task computing	16	CO4,CO 5
Module 4: Principles of Parallel and Distributed Computing -Part 2	Task Computation with High-Throughput ,Task Introduction ,Frameworks for Task computing ,Task-based application model ,Data-intensive computing Characteristics ,Cloud Platforms and Applications ,Overview on Amazon Web Services (AWS) ,Overview of Google Cloud Platform (GCP) ,Overview of Microsoft Azure Cloud ,Cloud applications in scientific, business and consumer domain ,CRM and ERM	14	CO6
	Total:	60	
Assignments: Based on the curriculum as covered by the subject teacher.			
List of Books Text Books:			

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Buyya, Vecciola and Selvi	Mastering Cloud Computing : Foundations and Application Programming		Tata McGraw Hill
Reference Books:			
Aravind Doss	Cloud Computing		Tata McGraw Hill

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BCA602 CO1	S	M										
BCA602 CO2		S										
BCA602 CO3		S			M							
BCA602 CO4	M	M			S							

Name of the Course: BCA	
Subject: Internet of Things	
Course Code: BCAD601A	Semester: 6th
Duration: 60 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 6	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To be able to apply the knowledge and skills acquired from this course to build and test an end-to-end, working IoT system within the context of ICT industry and possible future trends of automation.
2	To be able to customize the communication protocol and hardware design depending on application.
3	To be able to infer information from sensed context.
Objective:	
Sl. No.	
1	To Understand the term IoT and importance of IoT devices
2	To Identify different components of IoT architecture and determines suitable IoT devices and sensors for particular case study
3	To understand the connection between devices and sensors and identify different issues of sensor calibration and deployment challenges
4	To understand the contrast of edge computing and cloud computing
5	To analyze the communication protocol for IoT
6	To analyze and visualize data generated from the IoT devices, Extraction of information to build up the knowledge base and Development of potential IoT application
Pre-Requisite:	
Sl. No.	
1.	Data Communication and Networking

2.	Python		
3.	Java		
Course Outcome:			
1.	Students will be able to deploy sensors and work with microcontroller.		
2.	Students will be able to learn what are the layers of IoT and how to develop a framework.		
3.	Students will be able to learn how to process the data and form a knowledge base from the data.		
4.	Students will be able to learn about the application areas and challenges of IoT		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction to IoT and Sensing	Introduction to IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Sensing, Edge computing, Data processing, Learning, Different type of sensors, working principal of some sensors like Ultrasonic sensor, Thermal Sensors, Infrared Sensors, Pollutant Sensors, pH, Turbidity, Dissolved oxygen sensor, Temperature, water flow sensors etc.	18	CO1
Module 2: IoT & M2M Sensing Layer and Microcontroller/Microcomputer	Machine to Machine, Difference between IoT and M2M, Software defined Network, Open source hardware, Play with Sensors using Arduino Programming, Local data processing using Raspberry Pi/Uddo Neo, Play with different Network Modules (Bluetooth, WiFi, GSM/GPRS)	18	CO1, CO2
Module 3: Wireless Networks Present and Future and IoT Protocols	Concept of TCP/IP protocol Stack, 802.11 Protocol (WiFi Network), Wireless medium access issues, LoRa Network, Acoustic Communication, Socket Programming, Wireshark Tool, QUIC Protocol, CoAP, MQTT	12	CO3
Module 4: Challenges in IoT and Case Study	Design challenges, Development challenges, Security challenges, Other challenges Case Study 1: (activity Identification) Human Activity using Ultra sonic Sensors/Thermal Sensors, Case Study 2: (Environment Monitoring) Pollution Monitoring and Forecasting in Indoor and Outdoor, Case Study 3: (Road Transportation System) (a)Important PoIs using GPS trails, (b)Context Aware Speed Profiling from Mobile Phone Sensors, (c)My Smartphone Can Monitor My Street-lights Case Study 4: (Challenged Networks) Offline Crisis Mapper Design using ChatBot, IoT Protocol Stack Development using Acoustic Communication Case Study 5: (Agriculture Monitoring): Smart Farming using MQTT Protocol through Cost-effective Heterogeneous Sensors	12	CO4
	Total:	60	

Based on the curriculum as covered by the subject teacher.

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Dr. Raj Kamal	Internet of Things Architecture and Design Principles		McGraw Hill Education (India) Private Limited
Arshdeep Bahga and Vijay Madisetti	Internet of Things: A Hands-on Approach		Universities Press
Reference Books:			
Pethuru Raj and Anupama C. Raman	The Internet of Things: Enabling Technologies, Platforms, and Use Cases		CRC Press

[illegible]

Name of the Course: BCA			
Subject: Digital Image Processing			
Course Code: BCAD601 B and BCAD691B		Semester: 6th	
Duration: 48 Hours		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 4		End Semester Exam: 70	
Tutorial: 0		Continuous Assessment: 30	
Practical: 4		Practical Sessional internal continuous evaluation: 40	
Credit: 4 + 2		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1	To gain knowledge of about digital image .		
2	To gain knowledge of image processing techniques.		
3	To enhance programming skills to implement image processing algorithms.		
Objective:			
Sl. No.			
1	To introduce and discuss the fundamental concepts and applications of Digital Image Processing.		
2	To discuss various basic operations in Digital Image Processing.		
3	To know various transform domains.		
Pre-Requisite:			
Sl. No.			
1	Knowledge of mathematics and coordinate geometry.		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Introduction Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing - Image Acquisition, Storage, Processing, Communication, Display.	8	10
02	Digital Image Formation A Simple Image Model, Geometric Model- Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform.	10	10
03	Image Enhancement Spatial Domain Method, Frequency Domain Method, Contrast Enhancement -Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, High-boost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.	8	20

04	Image Restoration Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation - Spatial Transformation, Gray Level Interpolation.	9	15
05	Image Segmentation Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection- Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding,; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.	9	15
	Sub Total:	44	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	48	100

Practical

Course Code:

BCAD691A Credit: 2

Skills to be developed:

List of Practical:

1. As compatible with theory syllabus.

Assignments:

Based on the curriculum as covered by subject teacher.

List of

Books Text

Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Gonzalves	Digital Image Processing		Pearson
S. Sridhar	Digital Image Processing		Oxford

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	A computer with moderate configuration.
2.	Matlab/ python opencv libraries

Name of the Course: BCA			
Subject: Information Security			
Course Code: BCAD601C		Semester: 5th	
Duration: 60 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial: 1		Continuous Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation: NA	
Credit: 6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	This introductory course is aimed at giving basic understanding about system security.		
2.	This entry-level course covers a broad spectrum of security topics and is based on real-life examples to create system security interest in the students		
3.	A balanced mix of technical and managerial issues makes this course appealing to attendees who need to understand the salient facets of information security basics and the basics of risk management.		
Objective:			
Sl. No.			
1.	Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.		
2.	Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.		
3.	Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.		
4.	Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges		
Pre-Requisite:			
Sl. No.			
2.	Not Required		
Contents			4 Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Information and Network Security fundamentals Overview of Networking Concepts Basics of Communication Systems, Transmission Media, Topology and Types of Networks, TCP/IP Protocol, Wireless Networks, The Internet Information Security Concepts Information Security Overview: Background and Current Scenario, Types of Attacks, Goals for Security, E-commerce Security Security Threats and Vulnerabilities, Overview of Security threats,	15	20

	Weak / Strong Passwords and Password Cracking, Insecure Network connections, Malicious Code Cybercrime and Cyber terrorism Cryptography Introduction to Cryptography, Digital Signatures, Public Key infrastructure, Applications of Cryptography, Tool and techniques of Cryptography		
02	Security Management Security Management Practices Overview of Security Management, Security Policy, Risk Management, Ethics and Best Practices Security Laws and Standards Security Assurance, Security Laws, International Standards, Security Audit	15	10
03	Information and Network Security Server Management and Firewalls User Management, Overview of Firewalls, Types of Firewalls, DMZ and firewall features Security for VPN and Next Generation Technologies VPN Security, Security in Multimedia Networks, Various Computing Platforms: HPC, Cluster and Computing Grids, Virtualization and Cloud Technology and Security	15	20
04	System and Application Security Security Architectures and Models Designing Secure Operating Systems, Controls to enforce security services, Information Security Models System Security Desktop Security, Email security, Database Security	11	20
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100

List of

Books Text

Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
B. A. Forouzan	Data Communications and Networking	3rd Ed	TMH
A. S. Tanenbaum	Computer Networks	4th Ed	Pearson Education/PHI
Reference Books:			
W. Stallings	Data and Computer Communications	5th Ed	PHI/ Pearson Education
Atul Kahate	Cryptography & Network Security		TMH

Name of the Course: BCA			
Subject: Advanced DBMS with PL-SQL			
Course Code: BCAD601D and BCAD691D		Semester: 6th	
Duration: 48 Hours		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 4		End Semester Exam: 70	
Tutorial: 0		Continuous Assessment: 30	
Practical: 4		Practical Sessional internal continuous evaluation: 40	
Credit: 4 + 2		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1	To gain knowledge of advanced database management ideas.		
2	To gain knowledge of concurrency control and recovery management procedures.		
3	To gain skill to write database programs using SQL or PL-SQL.		
4			
Objective:			
Sl. No.			
1	Understand the concept of Database transactions management.		
2	Understand the concept of concurrency control techniques and recovery management.		
3	Gain idea about distributed DBMS.		
4	To gain skill to write PL-SQL.		
Pre-Requisite:			
Sl. No.			
1.	None		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Query Optimization Algorithm for Executing Query Operations: External sorting, Select operation, Join operation, PROJECT and set operation, Aggregate operations, Outer join, Heuristics in Query Optimization, Semantic Query Optimization, Converting Query Tree to Query Evaluation Plan, multiquery optimization and application, Efficient and extensible algorithms for multi-query optimization, execution strategies for SQL sub queries, Query Processing for SQL Updates	6	5
02	ARQQuery Execution: Introduction to Physical-Query-Plan Operators, One-Pass Algorithms for Database, Operations, Nested-Loop Joins, Two-Pass Algorithms Based on Sorting, Two-Pass, Algorithms Based on Hashing, Index-Based Algorithms, Buffer Management, Parallel Algorithms for Relational Operations, Using Heuristics in Query Optimization, Basic Algorithms for Executing Query Operations.	6	5
03	Concurrency Control Serializability: Enforcing, Serializability by Locks, Locking Systems With Several, Lock Modes, Architecture for a Locking Scheduler Managing	4	20
	Hierarchies of Database Elements, Concurrency Control by Timestamps, Concurrency Control by Validation, Database recovery management		
04	Transaction processing: Introduction of transaction processing, advantages and disadvantages of transaction processing system, online transaction processing system,	8	20

	serializability and recoverability, view serializability, resolving deadlock, distributed locking. Transaction management in multi-database system, long duration transaction, high-performance transaction system.		
05	Object Oriented DBMS Overview of object: oriented paradigm, OODBMS architectural approaches, Object identity, procedures and encapsulation , Object oriented data model: relationship , identifiers, Basic OODBMS terminology, Inheritance , Basic interface and class structure, Type hierarchies and inheritance, Type extents and persistent programming languages, OODBMS storage issues.	4	10
06	DDB: Distributed Database Introduction of DDB, DDBMS architectures, Homogeneous and Heterogeneous databases, Distributed data storage, Advantages of Data Distribution, Disadvantages of Data Distribution Distributed transactions, Commit protocols, Availability, Concurrency control & recovery in distributed databases, Directory systems, Data Replication, Data Fragmentation. Distributed database transparency features, distribution transparency.	8	5
07	Database application: Active database: starburst, oracle, DB2, chimera, Applications of active database, design principles for active rules, Temporal database, special, text and multimedia database. Video database management: storage management for video, video preprocessing for content representation and indexing, image and semantic-based query processing, real time buffer management.	8	5
	Sub Total:	44	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	48	100

Practical

Course Code: BCA691

Credit: 2

List of Practical:

Implementation of practicals are adhered to the theoretical curriculum.

Assignments:

Based on the curriculum as covered by subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Henry F. Korth and Silberschatz Abraham	Database System Concepts		Mc.Graw Hill.
Ramez Elmasri, Shamkant B.Navathe	Fundamentals of Database Systems		Addison WesleyI
Stefano Ceri	Distributed Databases: Principles and Systems		

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1	Computer with moderate configuration
2	DBMS Package

Name of the Course: BCA			
Subject: GUI Programming with .NET			
Course Code: BCAD601E		Semester: 5	
Duration: 48 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam:70	
Tutorial: 1		Continuous Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation: 0	
Credit: 5+1		Practical Sessional external examination: 0	
Aim:			
Sl. No.			
1.	The aim is to make student efficient in windows programming.		
2.	Students can create the application which is fully object oriented.		
3.	Students can interoperate with other languages such as Asp.net , C#		
Objective:			
Sl. No.			
1.	Understanding the concept of windows programming with .Net platform		
2.	Understand the concept of windows component and different control statements		
3.	Understand and implement OOP concepts and database connectivity in .Net platform.		
Pre-Requisite:			
Sl. No.			
2.	Basics of programming language.		
2.	Logic building skills.		
Contents			
Chapter	Name of the Topic	Hours	Marks
01	Visual Basic .NET and the .NET Framework Introduction to .net framework -Features, Common Language Runtime (CLR), Framework Class Library (FCL), Visual Studio.Net – IDE, Languages Supported, Components, Visual Programming, VB.net- Features, IDE- Menu System, Toolbars, Code Designer, Solution Explorer, Object Browser, Toolbox, Class View Window, Properties Window, Server Explorer, Task List, Output Window, Command Window	5	10
02	List Box, Combo Box, Radio Button, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box, Scroll bar, Group Box, ToolTip Timer	10	10
03	Programming in Visual basic .net Data Types, Keywords, Declaring Variables and Constants,	10	20

	Operators, Understanding Scope and accessibility of variables, Conditional Statements- If- Then, If-Then-Else, Nested If, Select Case, Looping Statement- Do loop, For Loop, For Each- Next Loop, While Loop, Arrays- Static and Dynamic		
04	Functions, Built-In Dialog Boxes, Menus and Toolbar Menus and toolbars- Menu Strip, Tool Strip, Status Strip, Built-In Dialog Boxes – Open File Dialogs, Save File Dialogs, Font Dialogs, Color Dialogs, Print Dialogs, Input Box, Message Box, Interfacing With End user- Creating MDI Parent and Child, Functions and Procedures- Built-In Functions- Mathematical and String Functions, User Defined Functions and Procedures	5	10
05	Object Oriented Programming Object Oriented Programming- Creating Classes , Objects, Fields, Properties, Methods, Events , Constructors and destructors, Exception Handling- Models, Statements, File Handling- UsingFile Stream Class, File Mode, File Share, File Access Enumerations, Opening or Creating Files with File Stream Class, Reading and Writing Text using StreamReader and StreamWriter Classes, Data Access withADO.Net – What are Databases?, Data Access with Server Explorer, Data Adapter and Data Sets, ADO.NET Objects and Basic SQL. Connection with Sql Server	14	20
	Sub Total:	44	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	48	100
Assignments: Based on the curriculum as covered by the subject teacher. List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Fred Barwell	Professional VB.NET	2nd edition	WROX Publication
Jesse Liberty	Learning Visual Basic. NET	New Edition	O'RELLY
Reference Books:			
Paul Vick	The Visual Basic .Net Programming Language	Second Edition	Universities Press
List of equipment/apparatus for laboratory experiments: (If Required)			
Sl. No.			
1.	Computer with moderate configuration		
2.	VB.net software		

Name of the Course: BCA		
Subject: Major Project and Grand Viva-Voce		
Course Code: BCAD681		Semester: 6
Duration: 60 Hrs.		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Theory: 4		End Semester Exam: NA
Tutorial: 0		Attendance : NA
Practical: 4		Continuous Assessment: NA
Credit: 4+2		Practical/ Sessional internal continuous evaluation: 0
		Practical /Sessional external examination: 100
Aim:		
Sl. No.		
1	Analyze and apply the role of different software for the final Project	
2	Building team work.	
3	Divide work load among team members	
4	Deliver the project within time	
Objective:		
Sl. No.		
1	Understand and use different languages and platforms for application development	
2	Work with other team members .	
3	Understand the importance of team work and delivery of software projects within a specific time frame.	
Practical/ Sessional Examination: Examiner-		
Major Project documentation	20	
Minor Project Demo/ Q&A	50	
Grand Viva Voce covering the whole syllabus	30	100

PAPER NAME: ESSENTIAL STUDIES FOR PROFESSIONALS -
VIPAPER CODE: BCA(GS)601
CONTACT HOUR: 1L

Subject Code: BCA(GS)601	Semester: 6th
Subject Name: ESSENTIAL STUDIES FOR PROFESSIONALS -VI	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of humanities & social science subjects till class 10th standard and knowledge of Economics up to class 11th standard.	

Course Outcomes:

1. Learning Different Static Gk Questions along with daily current affairs.
2. Total revision on general knowledge chapters starting from 1st to 4th semester along with prelims level Mock Tests.
3. Acquiring knowledge on UPSC CSAT Paper I & along with different general awareness questions
4. Acquiring knowledge on different technological advances.

Course Content:

Module No.	Description
1.	Constitution of India: Evolution of Indian Constitution, Part -II and Part - III.
2.	History: Indian National Congress, National Movement- 1905- 1947.
3.	Geography: Physiography of India.
4.	Economics: Capital and Money Market, Fiscal System of India.
5.	Current affairs and Static GK: Monthly Current Affairs Magazine

Learning Resources:

Text Books:

1. Indian Constitution- M. Laxmikant
2. Indian Economy-Ramesh Singh
3. History of Modern India- Bepan Chandra
4. Geography of India- Majid Hussain

Reference Books:

1. Current Affairs Magazine of IEM-UEM
2. Lucent GK

**Paper Name: SKILL DEVELOPMENT FOR
PROFESSIONALS -VIPAPER CODE: BCA(GS)681
CONTACT HOUR: 1L**

Subject Code: BCA(GS)681	Semester: 6th
Subject Name: SKILL DEVELOPMENT FOR PROFESSIONALS -VI	
L-T-P : 1-0-0	
Pre-Requisites: Fundamental knowledge of Quantitative Aptitude, Logical Reasoning & Verbal English.	

Course Outcomes:

1. The ability to communicate effectively with a range of audiences.
2. The ability to face the test and interview conducted by different companies and succeed. And also, preparation to appear different competitive exams starts.
3. The ability to recognize the need for continuing professional development.
4. The ability to succeed in competitive exams (BANK/IBPS/SSC/GATE / GRE / PSU's/Placement Aptitude etc.)

Course Content

Module No.	Description
1.	Revision and Advanced Problems in Quantitative Aptitude 1) Numbers (+, -, x, etc), Percentages, Ratio, Partnership, Linear Equations, Profit & Loss 2) Averages, Mixtures & Allegations, Number System, Time and Work 3) Simple & Compound Interest, Other / Misc Quantitative Apt., Indices and Surds, Quadratic Equations 4) Permutations & Combinations, Probability, Geometry, Mensuration 5) Data Interpretation, Various Charts, Diagrams, Tables
2.	Revision and Advanced Problems in Reasoning 1) Coding, Series & Numbers, Blood Relations, Analogy 2) Cubes, Data Sufficiency, Non-Verbal Reasoning 3) Syllogisms, Puzzles, Machine I/O, Inequality 4) Seating Arrangement, Calendar / Clock 5) Statements, Other / Misc Logical Reasoning, Decision Making (Ethics)
3.	Revision and Advanced Questions in Verbal English 1) Grammar, 2) Clauses, 3) Spotting errors, 4) Sentence Correction, 5) Blanks, 6) Reading Comprehensions, 7) Vocabulary Newspaper reading: The Hindu & Economic Times.

Learning Resources:

Text Books:

1. Objective General English- S.P Bakshi
2. English Grammar and Competition-S.C Gupta
3. Fast Track Objective Arithmetic- Rajesh Verma
4. Quantitative Aptitude– S.Chand

Reference Books:

1. Advance Maths- Rakesh Yadav
2. Verbal and Non-Verbal Reasoning- R.S Agarwal
new approach to Reasoning- BS Sijwali

Name of the Course: BCA	
Subject: Automata & Natural Language Processing	
Course Code: BCAN-681	Semester: 6th
Duration: 36 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 0	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 0	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To introduce the fundamental techniques of natural language processing
2	To develop an understanding of the limits of those techniques
3	To introduce some current research issues, and to evaluate some current and potential applications using Automata and NLP
Objective:	
Sl. No.	
1	Be able to describe the architecture of and core concepts in automata theory and formal languages.
2	Be able to discuss the current and likely future performance of several NLP applications, such as machine translation and email response.
3	Be able to describe briefly a fundamental technique for processing language for several subtasks, such as morphological analysis, parsing, word sense disambiguation etc
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of Computer Fundamentals with operating systems and Internet Web Browsing experience
Course Outcome:	
1.	Acquire a fundamental understanding of the core concepts in automata theory and formal languages.
2.	Understanding the concepts of Lexical Analysis and Syntax Analyzer.
3.	Language and text Processing using Python. Understanding the concept of Automatic Natural Language, Text Corpora and Lexical Resources.
4.	Use NLP technologies to explore and gain a broad understanding of text data, analyses sentiment of a text document, perform topic modelling, text classification, implementation of real life application in a business environment.

Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction to Compiling	Compilers, Analysis of the source program, The phases of a compiler, Cousins of the compiler, The grouping of phases	6	CO1
Module 2: Lexical Analysis	The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language for specifying lexical analyzers, Finite automata, From a regular expression to an NFA, Design of a lexical analyzer generator	12	CO2
Syntax Analyzer	The role of the parser, Context-free grammars, Writing a grammar, Top-down parsing, Bottom-up parsing, Operator-precedence parsing, LR parsers, Using ambiguous grammars Parser generator		
Module 3: Language Processing and Python	Computing with Language: Texts and Words, A Closer Look at Python: Texts as Lists of Words, Computing with Language: Simple Statistics, Back to Python: Making Decisions and Taking Control, Automatic Natural Language Understanding	8	CO3
Accessing Text Corpora and Lexical Resources	Accessing Text Corpora, Conditional Frequency Distributions Lexical Resources, WordNet		
Module 4: Processing Raw Text	Strings: Text Processing at the Lowest Level, Text Processing with Unicode, Regular Expressions for Detecting, Word Patterns, Useful Applications of Regular Expressions, Normalizing Text, Regular Expressions for Tokenizing Text, Segmentation, Formatting: From Lists to Strings	10	CO4
Categorizing and Tagging Words	Using a Tagger, Tagged Corpora, Mapping Words to Properties Using Python Dictionaries N-Gram Tagging		
Learning to Classify Text	Supervised Classification, Further Examples of Supervised Classification, Evaluation, Decision Trees, Naive Bayes Classifiers		
	Total:	36	
Assignments: Based on the curriculum as covered by the subject teacher.			
List of Books Text Books:			

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Edward Loper, Ewan Klein	Natural Language Processing with Python	June 2009	O'Reilly Media
Alfred V.Aho Ravi Sethi Jeffrey D. Ullman	Principles, Techniques and Tools	New Version	

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		S									
CO2		M		M								
CO3		S	M									
CO4				M	M							

GE Basket for BCA (2021 Batch)

Basket No	GE Basket	Course Code	Course Name
Basket 1	GENERAL SCIENCE & MATHEMATICS	GE1B-01	Business Research Methods: Tool & Techniques
		GE1B-02	Business Mathematics
		GE1B-03	Mathematics for Computing
		GE1B-04	Operations Research
		GE1B-05	Inferential Statistics
Basket 2	OTHER COURSES	GE2B-01	Economics
		GE2B-02	Principles of Management & Organizational Behaviors
		GE2B-03	Decision Support System
		GE2B-04	Digital Marketing
		GE2B-05	Leadership Skill Development
Basket 3	HUMANITIES & HUMAN SKILLS	GE3B-01	Values & Ethics
		GE3B-02	Creative Writing
		GE3B-03	Leadership
		GE3B-04	Professional Communication
		GE3B-05	E-Learning
Basket 4	EMERGING TECH, INNOVATION & ENTREPRENEURS HIP	GE4B-01	Data Analysis with R
		GE4B-02	Guidance of Excel for office Assistance
		GE4B-03	Machine Learning with Python
		GE4B-04	Entrepreneurship Principles
		GE4B-05	E-Commerce & M-Commerce

GE Basket for BCA (2021 Batch)

Basket No	GE Basket	Course Code	Course Name
Basket 1	GENERAL SCIENCE & MATHEMATICS	GE1B-01	Business Research Methods: Tool & Techniques
		GE1B-02	Business Mathematics
		GE1B-03	Mathematics for Computing
		GE1B-04	Operations Research
		GE1B-05	Inferential Statistics
Basket 2	OTHER COURSES	GE2B-01	Economics
		GE2B-02	Principles of Management & Organizational Behaviors
		GE2B-03	Decision Support System
		GE2B-04	Digital Marketing
		GE2B-05	Leadership Skill Development
Basket 3	HUMANITIES & HUMAN SKILLS	GE3B-01	Values & Ethics
		GE3B-02	Creative Writing
		GE3B-03	Leadership
		GE3B-04	Professional Communication
		GE3B-05	E-Learning
Basket 4	EMERGING TECH, INNOVATION & ENTREPRENEURS HIP	GE4B-01	Data Analysis with R
		GE4B-02	Guidance of Excel for office Assistance
		GE4B-03	Machine Learning with Python
		GE4B-04	Entrepreneurship Principles
		GE4B-05	E-Commerce & M-Commerce

GE Baskets for CBCS structure programs (2020-21)

Basket No	GE Basket	Course Code	Course Name
Basket 1	GENERAL SCIENCE & MATHEMATICS	GE1B-01	Business Research Methods: Tool & Techniques
		GE1B-02	Business Mathematics
		GE1B-03	Mathematics for Computing
		GE1B-04	Operations Research
		GE1B-05	Inferential Statistics

(GE1B-01) : BUSINESS RESEARCH METHODS: TOOLS & TECHNIQUES

Credit Points– 6
Total Contact Hours - 60

Course Objectives

1. To understand the **basic concept, meaning and types of research** and its applications in various domains of business.
2. To formulate **research problems and hypotheses**, know about different types of hypotheses and write a research proposal. Should be able to identify the overall process of designing a research study from its inception to its report.
3. To understand **research design** as the blue print of the research process, in depth understanding of different types of research design with their implications.
4. To understand the concept and types of data used in research, and also to know about different types of data collection processes.
5. To familiarize students with different types of **scaling techniques**. Students should be able to distinguish between categorical and continuous measures.
6. To understand **questionnaire designing** and its type. Should be able to understand types of questions to be included in a questionnaire. Learn various advantages and disadvantages of the instrument.
7. To gain the concept of **population, sampling, sampling frame, sampling design** etc. Determination of sample size, understanding of sampling and non sampling error.
8. To formulate **research hypotheses**, to understand different ways to conduct a statistical test of a hypothesis, criteria to select an appropriate statistical test to answer a research question or hypothesis.
9. Able to understand the way of writing a **research report**, its type, structures and the guidelines for visual representation.
10. To gain knowledge with **ethical issues** in research, including those issues that arise in using quantitative and qualitative research

Course Outcomes (CO)

SN.	Outcome	Mapped Modules
1.	Apply Research & Development to solve managerial problems.	Module I/Unit 1
2.	Identify research problems and formulate hypotheses for effective outcome. Write an appropriate research proposal to conduct the research.	Module I/Unit 2
3.	Formulate research design by understanding different types of design and its implementation in different problem situation.	Module I/Unit 3
4.	Select appropriate type of data and design relevant data collection process.	Module I/Unit 4
5.	Use suitable scaling techniques for attitude measurement. Classify numerical and categorical variables for data analysis.	Module I/Unit 5
6.	Design fitting questionnaire for data collection purpose.	Module II/Unit 6

7.	Select appropriate sample units, sample size and types of sampling method. Design proper sampling design.	Module II/ Unit 7
8.	Formulate and test hypotheses using appropriate statistical technique.	Module II / Unit 8
9.	Write a research report maintaining all its structure to present the research output.	Module II / Unit 9
10.	Conduct research ethically maintaining all the integrity for an unbiased outcome.	Module II / Unit 10

MODULE I

Unit 1 - Introduction to Research: Meaning of research; Types of research- Exploratory research, Conclusive research; The process of research; Research applications in social and business sciences; Features of a Good research study. (4L)

Unit 2 - Research Problem and Formulation of Research Hypotheses: Defining the Research problem; Management Decision Problem vs Management Research Problem; Problem identification process; Components of the research problem; Formulating the research hypothesis- Types of Research hypothesis; Writing a research proposal- Contents of a research proposal and types of research proposals. (6L)

Unit 3 - Research Design: Meaning of Research Designs; Nature and Classification of Research Designs; Exploratory Research Designs: Secondary Resource analysis, Case study Method, Expert opinion survey, Focus group discussions; Descriptive Research Designs: Cross-sectional studies and Longitudinal studies; Experimental Designs, Errors affecting Research Design. (8L)

Unit 4 - Primary and Secondary Data: Classification of Data; Secondary Data: Uses, Advantages, Disadvantages, Types and sources; Primary Data Collection: Observation method, Focus Group Discussion, Personal Interview method. (6L)

Unit 5 - Attitude Measurement and Scaling: Types of Measurement Scales; Attitude; Classification of Scales: Single item vs Multiple Item scale, Comparative vs Non- Comparative scales, Measurement Error, Criteria for Good Measurement. (6L)

MODULE II

Unit 6 - Questionnaire Design: Questionnaire method; Types of Questionnaires; Process of Questionnaire Designing; Advantages and Disadvantages of Questionnaire Method. (6L)

Unit 7 - Sampling: Sampling concepts- Sample vs Census, Sampling vs Non Sampling error; Sampling Design- Probability and Non Probability Sampling design; Determination of Sample size- Sample size for estimating population mean, Determination of sample size for estimating the population proportion. (8L)

Unit 8 - Testing of Hypotheses: Concepts in Testing of Hypothesis – Steps in testing of hypothesis, Test Statistic for testing hypothesis about population mean; Tests concerning Means- the case of single population; Tests for Difference between two population means; Tests concerning population proportion- the case of single population; Tests for difference between two population proportions. (6L)

Unit 9 - Research Report Writing: Types of research reports – Brief reports and Detailed reports; Report writing: Structure of the research report- Preliminary section, Main report, Interpretations of Results and Suggested Recommendations; Report writing: Formulation rules for writing the report: Guidelines for presenting tabular data, Guidelines for visual Representations. (6L)

Unit 10- Ethics in Research: Meaning of Research Ethics; Clients Ethical code; Researchers Ethical code; Ethical Codes related to respondents; Responsibility of ethics in research **(4L)**

Suggested Readings:

1. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH.
2. Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press.
3. Research Methodology – C.R.Kothari, New age International Publishing House
4. Research Methodology—Ranjit Kumar, Sage Publication

Module Number	Contents	Total Hours	%age of questions	Covered CO	Covered PO
Module I/Unit 1	Introduction to Research	4	6.67	1	10
Module I/Unit 2	Research Problem and Formulation of Research Hypotheses	6	10	2	10
Module I/Unit 3	Research Design	8	13.33	3	10
Module I/Unit 4	Primary and Secondary Data: Classification of Data; Secondary Data	6	10	4	10
Module I/Unit 5	Attitude Measurement and Scaling	6	10	5	10
Module II/Unit 6	Questionnaire Design	6	10	6	10
Module II/Unit 7	Sampling	8	13.33	7	10
Module II/Unit 8	Testing of Hypotheses	6	10	8	10
Module II/Unit 9	Research Report Writing	6	10	9	10
Module II/Unit 10	Ethics in Research	4	6.67	10	10

(GE1B-02) : BUSINESS MATHAMETICS

Credit Points– 6

Total Contact Hours - 60

Course Objectives

1. Independent solving of Business Problems.
2. To understand the basics of Counting Principles using **Permutation & Combination** with larger data sets as the foundation stone of Mathematics.
3. To understand **Set Theory** and the rules of logic for effective business planning and operations.
4. To understand **Determinant Matrix** with Cramer's rule
5. To solve complicated and long calculations of financial institutions using **Logarithm**
6. To estimate costs in engineering projects etc. using **Binomial Theorem**
7. To understand the concept of **Derivation**
8. Use **Simple and Compound interest** to do business calculations such as value of money, maturity value, promissory notes, present value, and future value and be able to differentiate which mathematical method should be used for different problems.

Course outcomes (CO)

Sl. No.	Outcome	Module / Unit
1.	Apply basic concepts of Mathematical Techniques in solving practical problems in the field of business.	Module I/Unit 1
2.	Apply the techniques of Permutation in solving probability problems for effective business decision making process under risk.	Module I/Unit 2
3.	Apply the techniques of Combination in solving probability problems for effective business decision making process under risk.	Module I/Unit 3
4.	Apply the concept of Set Theory for solving complex calculations and optimize business operations of financial institutions.	Module I/Unit 4
5	Apply the concept of Determinants Matrix and properties	Module I/Unit 5
6.	Apply the concept of Logarithm for solving complex calculations and optimize business operations of financial institutions.	Module II/Unit 6
7.	Identify binomial coefficients given the formula for a combination and expand a binomial using the Binomial Theorem .	Module II/Unit 7
8	Apply the concept of Differentiation with its rule and applicability	Module II/Unit 8

9.	Define the concept of interest and show how it relates to the time value of money, distinguish between simple and compound interest and also between the nominal interest rate and the effective annual yield. Outline the process of calculating a repayment schedule for a loan to be repaid in equal installments, with each payment a blend of interest and principal.	Module II/ Unit 9
----	--	----------------------

MODULE I

Unit 1: Introduction

Definition of Statistics; Importance and scope of Mathematics and Statistics in business decisions; Limitations.(4L)

Unit 2: Permutations

Definition, Factorial notation; Theorems on permutation, permutations with repetitions; Restricted permutations.(8L)

Unit 3: Combinations

Definition; Theorems on combination; Basic identities;restricted combinations.(4L)

Unit 4: Set Theory

Definition of Set ; Presentation of Sets; Different types of Sets- Null Set, Finite and Infinite Sets, Universal Set , Subset , Power Set etc.; Set operations ;Laws of algebra of Sets .(6L)

Unit 5: Determinant Matrix

Determinants upto third order, Elementary properties of determinants, Minors and co-factors, Solution of a system of linear equations by Cramer's Rule (up to three variables).(6L)

MODULE II

Unit 6: Logarithm

Definition, Base & index of logarithm, general properties of logarithm, Common problems. (6L)

Unit 7: Binomial Theorem

Statement of the theorem for positive integral index, General term, Middle term, Equidistant terms, Simple properties of binomial coefficient.(8L)

Unit 8: Differentiation

Derivative and its meaning; Rules of differentiation; Geometrical interpretation; Significance of derivative as rate measure; Secondorder derivatives(8L)

Unit 9: Compound Interest and Annuities

Different types of interest rates; Concept of Present value and amount of sum; Types of annuities; Present value and amount of an annuity; including the case of continuous compounding; Valuation of simple loans and debentures; Problems relating to sinking funds.(10L)

Suggested Readings

1. Business Mathematics and Statistics- N G Das & J K Das, Tata McGraw Hill
2. M. Raghavachari, Mathematics for Management, Tata McGraw-Hill
3. S. Baruah, Basic Mathematics and its Application in Economics, Macmillan
4. R. S. Bhardwaj, Mathematics for Economics and Business, Excel Books
5. P. K. Giri and J. Bannerjee, Introductionto Business Mathematics, Academic Publishers

Module Number	Contents	Total Hours	%age of questions	Covered CO	Covered PO
Module I/Unit 1	Introduction	4	6.67	1	10
Module I/Unit 2	Permutations	8	13.33	2	10
Module I/Unit 3	Combinations	4	6.67	3	10

Module I/Unit 4	Set Theory	6	10	4	10
Module I/Unit 5	Determinant Matrix	6	10	5	10
Module II/Unit 6	Logarithm	6	10	6	10
Module II/Unit 7	Binomial Theorem	8	13.33	7	10
Module II/Unit 8	Differentiation	8	13.33	8	10
Module II/Unit 9	Compound Interest and Annuities	10	16.67	9	10

Name of the Course: BCA	
Subject: Mathematics for Computing	
Course Code: GE1B-03	Semester: 1st
Duration: 60 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 6	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To enable critical thinking in relation to Linear Algebra.
2	To develop in students, the Mathematical Analysis to understand Sequences and Series.
3	Independent research regarding probabilistic problems in real life.
4	Understand and use a limited sample to make intelligent and accurate conclusions about a greater population.
Objective:	
Sl. No.	
1	Describe examples of infinite dimensional vector space.
2	How to implement probability theory in other domain.
3	How to deal with statistical data.
4	Understanding different methods for solving different problems.
Pre-Requisite:	
Sl. No.	
1.	Basic concept of algebra, geometry, Matrix, Group Theory, Permutation & Combination.
Course Outcome:	
1.	Develop the concepts of Sequence and Infinite Series.
2.	Use the knowledge of probability & statistics on other fields of Mathematics and their applications in real world.

3.	Understand the theories and principles of linear algebra.		
4.	Relate and demonstrate the concepts learned with the real life probabilistic problems.		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Linear Algebra	Orders n-tuples of real numbers, Vector space, Vector and scalars, Theorems, Subspaces, Linear Combination of Vectors, Generator or Spanning Vectors, Linear dependence and independence of vectors basis, Dimension of a vector space, Co- ordinate vector, Linear transformation, Rank of a Linear Transformation, Kernel of a Linear Transformation, Sylvester's Law, Representation of Linear Transformation by Matrix.	16	CO3
Module 2: Sequence & Infinite Series	<p>Introduction, Sequence, Graphical representation of Sequence, Bounded and Unbounded Sequences, Monotone Sequence, Convergence or Divergence of a Sequence, Convergent Sequence, Divergent Sequence, Oscillatory Sequence, Behaviour of Convergent Sequence and Monotone Sequences, Algebra of Convergent Sequences, sandwich theorem, Cauchy's first Theorem, Cauchy's second Theorem, Cauchy's Sequence, Cauchy's general principle of Convergence.</p> <p>Introduction, Infinite Series, Convergent Series, Divergent Series, Oscillatory Series, Geometric series, Some properties of an infinite series, Comparison Test, p-Series, D'Alembert's ratio test, Raabe's Test, Cauchy's root test, Alternating Series, Leibnitz's test, Absolute and conditional convergence, Re-arrangement of an absolutely convergent series, Dirichlet's theorem, Abel's test, Dirichlet's test.</p>	14	CO1
Module 3: The concept of Probability, An axiomatic construction of the Theory of probability, Compound or Joint	Introduction, Random Experiment, Event Space, Events, Simple and Composite events, Mutually Exclusive events, Exhaustive set of events, Statistical Regularity, Classical Definition of Probability, Frequency Definition of Probability, Axiomatic Definition of Probability, Frequency Interpretation of Probability, Deductions from Axiomatic definition, Conditional probability, Frequency interpretation, Bayes' theorem, Independence of events, Mutual and pairwise independence of more than two events, General multiplication rule, Compound or joint experiment, Independence of random experiment, Independent trials, Bernoulli trials, Binomial Law, Multinomial Law, Infinite sequence of Bernoulli trials, Poisson trials.	17	CO2

Experiment			
Module 4: Probability Distributions, Random Samples	Random Variables, Distribution functions, Discrete distribution, Probability Mass Function, Important discrete distributions, Continuous Random Variables, Probability Density Function (p.d.f) of a continuous distribution, Important Continuous Distributions Distinction between discrete and continuous random variables Mixed Distribution, Population and samples, Distribution of the sample Tables and graphical representation, Sample Characteristics, Computation of sample characteristics.	13	CO4
	Total:	60	
Assignments: Based on the curriculum as covered by the subject teacher. List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
B. K. PAL, K.DAS	BCA MATHEMATICS	2nd Edition	U. N. DHUR & SONS PRIVATE LTD
B. K. PAL, K.DAS	BCA MATHEMATICS Volume-III	4 th Edition	U. N. DHUR & SONS PRIVATE LTD
Banerjee, De, Sen	Mathematical probability	Revised 3rd Edition	UN Dhur Publications
Amritava Gupta	Groundwork of Mathematical Probability and Statistics	Revised 4th edition	Academic Publishers
Reference Books:			
S K Mapa	Higher Algebra Abstract and Linear	10 th Edition	Sarat Book Distributors

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
GE1B-03 CO1	S	M		S								
GE1B-03 CO2		S	M	M								
GE1B-03 CO3		M	S									
GE1B-03 CO4	M		S	M								

**Operations Research
(GE1B-04)**

Subject: Operations Research		
Course Code: (GE1B-04)		Semester: 1st
Duration: 60Hrs		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Theory: 5		End Semester Exam: 70
Tutorial: 1		Continuous Assessment:30
Practical:0		Practical Sessional internal continuous evaluation: NA
Credit: 6		Practical Sessional external examination: NA
Aim:		
Sl. No.		
1.	To learn how to solve problem in optimized way.	
2.	Use various technique like game theory, LPP in real life problem.	
Objective:		
Sl. No.		
1.	Understand the optimization method	
2.	To evaluate the reliability and validity of a measuring	
3.	Apply the method to other Real life Problem	
Pre-Requisite:		
Sl. No.		
1.	Mathematics	
2.	Linear Algebra	
Contents		6 Hrs./week

Chapter	Name of the Topic	Hours	Marks
01	Linear Programming Problems (LPP): Basic LPP and Applications; Various Components of LP Problem Formulation.	8	10
02	Solution of Linear Programming Problems: Solution of LPP: Using Simultaneous Equations and Graphical Method; Definitions: Feasible Solution, Basic and non-basic Variables, Basic Feasible Solution, Degenerate and Non-degenerate Solution, Convex set and explanation with examples. Solution of LPP by Simplex Method; Charnes' Big-M Method; Duality Theory. Transportation Problems and Assignment Problems.	12	20
03	Network Analysis: Shortest Path: Floyd Algorithm; Maximal Flow Problem (Ford-Fulkerson); PERT-CPM (Cost Analysis, Crashing, Resource Allocation excluded).	8	5
04	Inventory Control: Introduction to EOQ Models of Deterministic and Probabilistic ; Safety Stock; Buffer Stock.	8	10
05	Game Theory: Introduction; 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems (statement only) and problems; Games without Saddle Point; Graphical Method; Principle of Dominance.	10	15
06	Queuing Theory: Introduction; Basic Definitions and Notations; Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: (M/M/1): (∞ / FIFO) and (M/M/1: N / FIFO) and problems.	10	10
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
H. A. Taha	Operations Research		Pearson

Reference Books:

P. M. Karak	Linear Programming and Theory of Games		ABS Publishing House
Ghosh and Chakraborty	Linear Programming and Theory of Games		Central Book Agency

**Inferential Statistics
(GE1B-05)**

Subject: Inferential Statistics	
Course Code: (GE1B-05)	Semester: 1st
Duration: 60 Hrs	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial: 1	Continuous Assessment:30
Practical:0	Practical Sessional internal continuous evaluation: NA
Credit: 6	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To learn how to set up and perform hypothesis tests
2	Use regression analysis to analyze and interpret data collected from ANOVA and ANCOVA designs.
Objective:	
Sl. No.	
1.	To enable students to analyze and interpret data
2.	Understand the types of questions that the statistical method addresses
3.	To evaluate the reliability and validity of a measuring
4.	Apply the method to other examples and situations
5.	Use data to make evidence-based decisions that are technically sound
Pre-Requisite:	
Sl. No.	

1.	Mathematics		
2.	Probability Statistics		
Contents		6 Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	Estimation: Concepts of estimation, unbiasedness, sufficiency, consistency and efficiency. Factorization theorem. Complete statistic, Minimum variance unbiased estimator (MVUE) and Rao-Blackwell theorem with applications. Cramer-Rao inequality and MVB estimators (statement and applications).	12	10
02	Methods of Estimation: Method of moments, method of maximum likelihood estimation.	8	5
03	Principles of test of significance: Null and alternative hypotheses (simple and composite), Type-I and Type-II errors, critical region, level of significance, size and power, best critical region, most powerful test, uniformly most powerful test,	12	20
04	Neyman-Pearson Lemma (statement and application to construct most powerful test). Likelihood ratio test and relevant problems, properties of likelihood ratio tests (without proof).	12	15
05	Interval estimation - Confidence interval for the parameters of various distributions, Confidence interval for Binomial proportion, Confidence interval for population correlation coefficient for Bivariate Normal distribution, Pivotal quantity method of constructing confidence interval, Large sample confidence intervals.	12	20
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100
List of Books			
Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Goon A.M.,	Fundamentals of		World Press

Gupta M.K.: Das Gupta.B.	Statistics		
Reference Books:			
Rohatgi V.K. and Saleh, A.K. Md. E.	An Introduction to Probability and Statistics	2ndEdn	John Wiley & Sons.
Dudewicz, E. J., and Mishra, S. N.	Modern Mathematical Statistics		John Wiley & Sons.
Bhattacharjee , D. & Das, K. K.	A Treatise on Statistical Inference and Distributions		Asian Books
Hogg, R.V., Tanis, E.A. and Rao J.M	Probability and Statistical Inference	Seventh Ed	Pearson Education

GE Baskets for CBCS structure programs (2020-21)

Basket No	GE Basket	Course Code	Course Name
Basket 2	OTHER COURSES	GE2B-01	Economics
		GE2B-02	Principles of Management & Organizational Behaviors
		GE2B-03	Decision Support System
		GE2B-04	Digital Marketing
		GE2B-05	Leadership Skill Development

Subject: Economics Course Code: GE2B-01

Name of the Course: BCA			
Subject: Economics (GE2B-01)			
CourseCode: GE2B-01		Semester: 2nd	
Duration: 60 Hours		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End SemesterExam: 70	
Tutorial: 1		Internal Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation:	
Credit: 6		Practical Sessional external examination:	
Aim:			
Sl. No.			
1.	Build a foundational understanding of economics for Capital Markets		
2.	Establish a link between various components of the Capital Markets		
Objective:			
Sl. No.			
1.	To gain an understanding of economic concepts for Capital Markets		
Pre-Requisite:			
Sl. No.			
1.	Basic knowledge of Economics		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01 Introduction	<ul style="list-style-type: none">• Scope and Importance of Business Economics• Basic tools- Opportunity Cost principle- Incremental and Marginal Concepts• Basic economic relations - functional relations: equations- Total, Average and Marginal relations• Use of Marginal analysis in decision making, The basics of market demand, market supply and equilibrium price- shifts in the demand and supply curves and equilibrium	12	14

02 Demand Analysis	<ul style="list-style-type: none">• Demand Function - nature of demand curve under different markets Meaning, significance, types and measurement of elasticity of demand (Price, income cross and promotional)-relationship between elasticity of demand and revenue concepts• Demand estimation and forecasting: Meaning and significance - methods of demand estimation: survey and statistical methods (numerical illustrations on trend analysis and simple linear regression)	12	14
03 Supply and Production Decisions and Cost of Production	<ul style="list-style-type: none">• Production function: short run analysis with Law of Variable Proportions- Production function with two variable inputs- isoquants, ridge lines and least cost combination of inputs- Long run production function and Laws of Returns to Scale - expansion path - Economies and diseconomies of Scale.• Cost concepts: Accounting cost and economic cost, implicit and explicit cost, fixed and variable cost - total, average and marginal cost - Cost Output Relationship in the Short Run and Long Run (hypothetical numerical problems to be discussed), LAC and Learning curve - Break even analysis (with business applications)	12	14
04 Market structure: Perfect competition and Monopoly and Pricing and Output Decisions under Imperfect Competition	<ul style="list-style-type: none">• Short run and long run equilibrium of a competitive firm and of industry - monopoly - short run and long- run equilibrium of a firm under Monopoly• Monopolistic competition: Equilibrium of a firm under monopolistic competition, debate over role of advertising (topics to be taught using case studies from real life examples)• Oligopolistic markets: key attributes of oligopoly - Collusive and non-collusive oligopoly market - Price rigidity - Cartels and price leadership models (with practical examples)	12	14
05 Pricing Practices	<ul style="list-style-type: none">• Cost oriented pricing methods: cost – plus (full cost) pricing, marginal cost pricing, Mark up pricing, discriminating pricing, multiple – product pricing - transfer pricing• Case studies on how pricing methods are used in• business world	12	14
	Sub Total:	60	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:	60	100
Assignments: Based on the curriculum as covered by subject teacher.			
List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Roy E. Bailey	The Economics of Financial Markets	2005/978-0521612807	Cambridge University Press Pearson
Paul Heyne,Peter Boettke,David Prychitko	The Economic of way Thinking	978/0132991292	
Reference Books:			
Milton Friedman	Money Mischief	1994/ 978-0156619301	Harcourt Publishers Group

**Subject: PRINCIPLES OF MANAGEMENT & ORGANIZATIONAL
BEHAVIOUR**

Course Code: GE2B-02

Credit Point 6

Total Credit Hours: 60 Hrs.

Course Objective

1. To help the students to develop cognizance of the importance of management principles.
2. To understand the planning process in the organization.
3. To enable them to analyze and understand the environment of the organization.
4. To study the system and process of effective controlling in the organization.
5. To understand the concept of behavior in an organizational settings & to explain, predict and influence behavior of others.
6. To help the students to develop the concepts of Human Behaviour.
7. To know the concept of motivation & how to motivate people for their work according to various theories.
8. To enable them to understand the group behavior & the communication process in an organization.
9. To help the students to develop the process of leading individuals, managing conflicts.
10. To enable them to understand the culture of the organization & execute the strategy according to the situation.

Course Outcomes (CO):

SL NO.	Course Outcome	Mapped Modules
1	Students will be able to have clear understanding of managerial functions like planning, and have same basic knowledge on international aspect of management	Module I – Unit 1
2	Students will be able to explain the relationship between strategic, tactical and operational plans	Module I – Unit 2
3	Students will be able to understand the concept of organization.	Module I – Unit 3
4	Students will be able to analyze isolate issues and formulate best control methods	Module I – Unit 4
5	Students will be able to develop insight on how employees behave & perform in the workplace.	Module II – Unit 5

6	Students will get knowledge to improve personal adjustment & interpersonal relationship	Module II – Unit 6
7	Students will be able to analyze & compare different models used to explain individual behavior related to motivation & rewards.	Module II – Unit 7
8	Students will be able to explain group dynamics & demonstrate skills required for working in groups.	Module II – Unit 8
9	Students will learn to explore & will develop a sense of confidence & belief in themselves & their ideas.	Module II – Unit 9
10	Students will be able to understand that how organizational culture influences the behavior of organizational members.	Module II – Unit 10

Module I

Unit 1:Introduction to Management

[4L]

Nature, purpose and scope of management, Skills and roles of a Manager, Functions, Development of Management Theories (Classical, Neo-Classical and Modern)

Unit2: PlanningProcess

[6L]

Types of plans, Levels of planning, planning process, Management by objectives, Strategic Management, premising and forecasting; Decision-Making process, barriers, styles of decision making

Unit3:OrganizingProcedure

[8L]

Organizational design and structure, Coordination, centralization and de- centralization, Delegation, Authority & power – concept & distinction, Line and staff organizations.

Unit4:ControllingSystem

[8L]

Concept, planning-control relationship, process of control, Types of Control, Control Techniques, and Staffing: Human Resource Management and Selection

Module II

Unit5:IntroductiontoOrganizationalBehaviour

[4L]

The nature and determinants of organizational behaviour, need for knowledge of OB, contributing disciplines to the field, OB Model

Unit6:Individualdifferences

[8L]

Learning, Values, attitudes, Personality (MBTI, Big Five Model), Emotional Intelligence, Perception, Attribution theory

Unit 7: Work Motivation

[8L]

Early Theories (Mc. Gregory's Theory X & Y , Abraham Maslow's Need Hierarchy Theory Herzberg's Two Factor Theory) & Contemporary Theories (Mc. Clelland's 3 Needs Theory , Alderfer's ERG Theory , Adam's Equity Theory & Vroom's Expectancy Theory, Goal Setting Theory), Application of Motivation Theories & workers participation management.

Unit 8: Group Behaviour**[8L]**

Types of Groups, Stages of Group Development, Group Decision Making, understanding Teamwork: Types of Teams, Creating Effective teams, Communication: significance, types, barriers, overcoming barriers.

Unit 9: Leadership**[8L]**

Basic Approaches (Trait Theories, Behavioral Theories & Contingency Theories) & Contemporary Issues in Leadership. Conflict: levels of conflict, resolving conflicts; power and politics: sources of power, use of power

Unit 10: Organization culture and Change**[8L]**

Effects of culture, changing Organizational culture forces of change, Resistance to change, the change process.

Suggested Readings:

1. Management, Robbins, Stephen P, and Mary Coulter, Prentice Hall, New Delhi. Robbins, Stephen P: "Organizational Behavior" Prentice Hall
2. Principles of Management, Govindarajan & Natarajan, Prentice Hall of India Private Limited.
3. Management, Stoner, Freeman & Gilbert, Jr., Prentice Hall of India private Limited
4. Organizational Behavior: Human Behavior at Work, Newstrom, John W. and Keith Davis, Tata McGraw-Hill.

Module No.	Content	Total Hour s	%age of question s	Covered CO	Covered PO
Module I Unit 1	Introduction to Management	4	7	1	8
Module I Unit 2	Planning Process	6	10	2	8
Module I Unit 3	Organizing Procedure	8	10	3	8
Module I Unit 4	Controlling System	8	10	4	8
Module II Unit 5	Introduction to Organizational Behavior	4	7	6	8
Module II Unit 6	Individual differences	6	12	6	8
Module II Unit 7	Work Motivation	6	12	7	8
Module II Unit 8	Group Behavior	6	10	8	8
Module II Unit 9	Leadership	6	12	9	8
Module II Unit 10	Organization culture and Change	6	10	10	8

Subject: Decision Support System

Code: GE2B-03

Course Objective:

1. To review and clarify the fundamental terminologies, ideas and concepts associated with Decision Support Systems and other aligned systems.
2. To discuss and grow skills in the analysis, design and implementation of computerized Decision Support Systems.
3. To understand and evaluate the importance of Decision Support Systems in organizational and social context.

Sl	Course Outcome	Mapped modules
1	Remembering	M1, M2, M3, M4, M5, M6
2	Understanding the course	M1, M2, M3, M4, M5, M6
3	Applying the general problem	M3, M4, M5, M6
4	Analyse the problems	M2, M4, M5.
5	Evaluate the problems after analysing	M2, M3.
6	Create using the evaluation process	M1, M2 (Case study), M3, M4, M5, M6.

Module Number	Content	Total Hours	%age of questions	Bloom's Level (if applicable)
M 1	Introduction	10	10	L1, L2
M 2	Application of DSS techniques	10	25	L1, L2, L4
M 3	Excel Basics	10	10	L1, L2, L3
M 4	Advanced excel functions	10	25	L1, L2, L3, L4
M 5	Pivot tables and statistical functions	10	25	L1, L2, L3, L4
M6	Intro to VBA	10	5	L1, L2, L3
		60	100	

Sl.	Topic/Module	Hour
1.	Module 1: Understand concepts of a Decision Support System (DSS) and its effect on management, purpose of a DSS. Data warehousing, Differentiate between the data warehouse, Data Marts, and Data Mining. Differentiate between OLAP and OLTP systems. Contrast data, information, and knowledge as they apply to the DSS. Define computer-based inferencing. Discuss various tools assisting IT professionals surrounding DSS.	10
2.	Module 2: Application of DSS techniques to real-world scenarios and situations. Construct an expert system using a programming language or the Microsoft Office suite of tools. Perform data analysis using Microsoft Excel pivot tables. Apply the Nominal Group Technique (NGT) and the Delphi method. Use linear programming methods to solve multivariate problems.	10
3.	Module 3: Excel Basics, Formatting, Referencing and Names, Functions and Formulas, Charts: When to use which chart.	10
4.	Module 4 : Advanced excel functions: vlookup, hlookup, fuzzy lookup, match, index, statistical functions, etc.	10
5.	Module 5: Pivot Tables, Statistical Analysis , The Solver and other tools (what-if analysis etc).	10
6.	Module 6: Intro to VBA, Recording Macros, Objects and Variables.	10

Suggested Readings:

1. Clyde W. Holsapple: Decision Support Systems: A Knowledge Based Approach, West Group
2. Douglas Schwartz : Decision Support Systems, Clanrye International
3. Clyde W. Holsapple: Decision Support Systems: Theory and Application, Springer-Verlag
4. Manish Nigam: Advance Excel 2019 Training Guide: Tips and tricks to kick start your excel skills, BPB Publications.
5. Wayne Winston: Microsoft Excel Data Analysis and Business Modeling, Microsoft Press.

Name of the Course: BCA			
Subject: Digital Marketing			
Course Code: GE2B-04		Semester: 6	
Duration: 48 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam:70	
Tutorial: 1		Continuous Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation: 0	
Credit: 5+1		Practical Sessional external examination: 0	
Aim:			
Sl. No.			
1	This course is aimed at giving basic understanding about the Digital marketing		
2	This course is aimed at familiarizing the different styles & strategies of Digital Marketing		
3	This course is aimed at providing plans and campaigns that are digitally becoming more prevalent in the current scenario.		
Objective:			
Sl. No.			
1.	Develop an understanding of Digital marketing concepts.		
2.	Develop and execute transformational digital Marketing Strategies and best practices		
3.	Understand the digital customer behavior and identify demand metrics to effectively measure and optimize marketing in the current scenario.		
Pre-Requisite:			
Sl. No.			
1.	NA		
Contents			
Chapter	Name of the Topic	Hours	Marks
01	Overview About Digital Marketing, Difference between Traditional Marketing and Digital Marketing, Benefits of using digital media, Inbound and Outbound Marketing, Online marketing POEM: (Paid, Owned, and Earned Media), Components of Online Marketing (Email, Forum, Social network, Banner, Blog)	5	10
02	Search Engine Optimization (SEO) About SEO, Need of an SEO friendly website, Search Engine, Role of Keywords in SEO, Off-page Optimization, On-page Optimization concepts, Organic SEO vs Non-organic SEO	5	10

03	Social Media Marketing (SMM) About Social Media Marketing, Different types of Social Media Marketing	5	5
04	Content Marketing About Content Marketing, Goals of Content Marketing, Types Of Contents, etc.	5	5
05	Online Advertising About Online Advertising, Advantages of Online Advertising, Paid versus Organic, Pay Per Click (PPC) Model. Basic concepts CPC, PPC, CPM, CTR, CR	10	5
06	Email Marketing About Email marketing, Email newsletters, Digests, Dedicated Emails, Lead Nurturing, Sponsorship Emails and Transactional Emails, Drawbacks of Email Marketing	10	5
07	Mobile Marketing About Mobile Marketing, Objectives of Mobile Advertising, Creating a Mobile Marketing Strategy, About SMS Marketing	5	10
08	Online Marketing Types Basics of Affiliate Marketing, Viral Marketing, Influencer Marketing. Referral Marketing Web analytics About Web Analytics, Types of Web Analytics(On-site, Off-site), Importance of Web Analytics	7	15
09	Online Marketing Impact Impact, Pros & Cons	4	5
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Vandana Ahuja	Digital Marketing	1st edition	Oxford

Reference Books :

PROF. SURABHI SINGH	Digital Marketing	New edition	MEWAR UNIVERSITY PRESS
---------------------	-------------------	-------------	------------------------

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	NA
2.	NA

Course name: Leadership Skill Development

Paper Code: GE5B-05

Total Hour: 60 Hours

Credits: 6

Course Objective: The course is designed to provide a general understanding of Leadership. The students will be able to gain multiple leadership theories, based on they can enhance their leadership qualities so that they can manage themselves, stress as well control their followers.

Sl	Course Outcome	Mapped modules
1	Understand the fundamental components of leadership	M1
2	Understand the theories of leadership	M2
3	Understand the emotions and self-management	M3
4	Understand Leader and his or her followers.	M4
5	Analyze Leadership and teams	M5
6	Analyze the Creative leadership	M6

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)
Module 1	fundamental components of leadership	10	15	1, 2
Module 2	theories of leadership	14	15	1, 2
Module 3	Emotions and self-management	08	15	1, 2
Module 4	Leadership and followers	06	15	1, 2
Module 5	Leadership and teams	10	15	2, 3
Module 6	Creative leadership.	12	25	2, 3
		60	100	

Detailed Syllabus:

M1	Definition of leadership, objectives, importances, styles with advantages and disadvantages
M2	Theories of leadership, Trait approach in theories of leadership (development and the present situation). Personal characteristics that support effective leadership. Leader and values. The significance of self-knowledge for the role of leader (identity and integrity of leader).
M3	. Emotions and self-management, emotional intelligence and its significance in the role of leader. Handling emotions and stress. Personal risk of leader: personal traits endangering effective leadership
M4	Understand Leader and his or her followers. Models of relation between leadership and followership. LMX theory.
M5	Leadership of workgroups and teams. Group structure and dynamics. Individual in a group. Formation of teams and team work. Group problem-solving. Team excellence. Participative leadership.
M6	Creative leadership. Influence on the creative potential of work groups and teams; formation of innovative climate in organizations.

Suggested Readings:

1. Robbins, S. P: Management, Prentice Hall.
2. Stoner, J and Freeman, R. E: Management; Prentice-Hall
3. Daft, R. L: Management, Thomson
4. Aswathappa, K: Organizational Behaviour (Text, Cases and Games).Bangalore: Himalaya Publication.
5. Greenberg, J., & Baron, R. A. (2008). Behaviour in Organizations, Pearson.
6. Robbins, S. P.: Essentials of Organizational Behaviour, Prentice Hall

GE Baskets for CBCS structure programs (2020-21)

Basket No	GE Basket	Course Code	Course Name
Basket 3	HUMANITIES & HUMAN SKILLS	GE3B-01	Values & Ethics
		GE3B-02	Creative Writing
		GE3B-03	Leadership
		GE3B-04	Professional Communication
		GE3B-05	E-Learning

Name of the Course: BCA	
Subject: Values & Ethics	
Course Code: GE3B-01	Semester: 3rd
Duration: 60 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 0	Continuous Assessment: 30
Practical: 0	Practical Sessional internal continuous evaluation: NA
Credit: 2	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	This course is aimed at giving basic understanding about the values of Ethics and Morality.
2	This course is aimed at familiarizing the different theories related to Ethics.
3	This course is aimed at providing knowledge about the ethical protocols defined for Professional world.
Objective:	
Sl. No.	
1	Develop an understanding of Ethics and Morality.
2	Develop a basic understanding of ethical protocols defined for professional world.
3	Develop a balanced approach towards the assigned responsibilities in ethical and moral way.
Pre-Requisite:	
Sl. No.	
1.	None
Course Outcome:	
1.	Help in taking the right decisions in difficult situations thus improving decision-making abilities.
2.	Inculcate students with essential values like kindness, compassion and empathy.
3.	Awaken curiosity in children developing their values and interests.
4.	Ensure a holistic approach to a child's personality development in terms of physical, mental, emotional and spiritual aspects.

Contents		
Modules	Serial of Modules	Hours
Module 1 : Introduction to Ethical Theories	Consequentialist and Non-consequentialist theories, Hedonism, Utilitarianism, Virtue Ethics, Ethical Relativism, Ethical Naturalism	6
Module 2 : Ethics and Morality	Ethics and Morals, Ethics in Indian Tradition, Building character in workplace, Moral and Ethical Judgment: Canons of ethics, Ethics of duty, Ethics of responsibility	8
Module 3 : Ethics and Environment	Rapid technological growth and depletion of resources, Sources of energy, Energy crisis, Reports of Club of Rome, Environmental degradation, Environmental Regulations, Environmental Ethics, Eco- friendly technologies, Sustainable Development, Important and recent national and international conventions on environment, Appropriate Technology Movement of Schumacher: Later developments	12
Module 4 : Technology and Developing Nations- Technology transfer	Problems of technology transfer, Stages of technology transfer, Problems of technology transfer, Technology Impact Assessment, Problems of man machine interaction, Impact of Assembly line, Automation, Corporate Social Responsibility	12
Module 5 : Ethics of Profession	Attributes of a profession, Science, Technology and Engineering as Knowledge and as Social and Professional Activities, Engineering profession: Ethical issues in engineering practice, Conflicts between business demands and professional ideals, Social and ethical responsibilities of Technologists, Codes of professional ethics, Whistle blowing and beyond. Case studies	10
Module 6 : Profession and Human Values	Value Crisis in contemporary society, Nature of values: Value Spectrum of a 'good' life, Psychological values: Integrated personality; mental health, Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution, Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity	12
	Total	60

Assignments: Based on the curriculum as being covered by the subject teacher.			
List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Biswanath Ghosh	Ethics in Management and Indian Ethos		Vikas Publishing
Sumita Manna	Values and Ethics in Business and Profession		PHI Publishing
Reference Books:			
Balachandran, Raja & Nair	Ethics, Indian Ethos and Management		Shroff Publishers and Distributors Pvt. Ltd
A. N. Tripathi	Human Values		New Age International

Name of the Course: BCA			
Subject: Creative Writing			
Course Code: GE3B-02		Semester: 3 rd	
Duration: 60 Hrs		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial:1		Continuous Assessment: 30	
Practical:0		Practical Sessional internal continuous evaluation: NA	
Credit:6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	Revealing insightful ways in which complex socio-historical (or other, such as aesthetic) contexts and assumptions inform the production, distribution, and/or reception of object of study.		
2.	Locating and selecting verified, reputable sources to create insightful analysis or synthesis.		
3.	Utilizing a language that skillfully communicates with clarity and fluency.		
Objective: The course opens up creative space for students of diverse academic backgrounds: Literary Studies, Science, Technology, Design, Social Studies, Architecture and so on.			
Sl. No.			
1.	To apply critical and theoretical approaches to the reading and analysis of literary texts in multiple genres.		
2.	Become capable of producing poems or literary non-fictional pieces that are original and engaging.		
3.	To articulate an awareness of the relationship between the individual works and conventional literary work.		
4.	To identify, analyze, interpret and describe critical ideas, themes, values that consist of literary texts and perceive the ways to evaluate how ideas, themes and values create an impact on societies, both in the past and present.		
Pre-Requisite:			
Sl. No.			
1.	Introductory Reading and Writing/Composition Courses		
Contents	6 Hrs./week		
Chapter	Name of the Topic	Hours	Marks

01	Creative Writing <ul style="list-style-type: none"> • Imaginative writing vs. technical / academic / other forms of writing • Sensory experience • Language -(Imagery , Figures of speech , Diction) <ul style="list-style-type: none"> • Sample works of well-known local and foreign writers 	12	15
02	Reading and Writing Poetry <ul style="list-style-type: none"> • Elements of the genre • Essential elements -Theme, Tone • Elements for specific forms -Conventional forms - exemplar: short Tagalog poems like tanaga and diona; haiku; sonnet -rhyme and meter -metaphor <ul style="list-style-type: none"> • Free verse -the line and line break -enjambments -metaphor <ul style="list-style-type: none"> • Other experimental texts -typography -genre-crossing texts (e.g. prosepoem, performance poetry, etc.)	14	15
03	Reading and Writing Fiction <ul style="list-style-type: none"> • Elements of the genre -Character -Point of View -1st-person POV (major, minor, or bystander <ul style="list-style-type: none"> - 2nd-person POV - 3rd-person POV (objective, limited omniscient, omniscient) <ul style="list-style-type: none"> • Plot (linear, modular/episodic, traditional parts: exposition, rising action, climax, falling action, resolution/denouement) 	12	15
	<ul style="list-style-type: none"> • Irony -verbal -situational -dramatic -moral/lesson -dramatic premise -insight <ul style="list-style-type: none"> • Techniques and literary devices -Mood/tone -Foreshadowing - Symbolism and motif - Modelling from well-known local and foreign short story writers in a range of modes		

04	Reading and Writing Drama (one-act) <ul style="list-style-type: none"> • Elements of the genre -Character -Setting -Plot -Dialogue <ul style="list-style-type: none"> • Techniques and literary devices <ul style="list-style-type: none"> - Intertextuality - Conceptualization of modality - Modelling from well-known local and foreign playwrights 	12	15
05	The creative work in literary and /or socio political context	6	10
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100
<p>Assignments:</p> <p>Based on the curriculum as covered by subject teacher.</p> <p>List of Books</p> <p>Text Books:</p>			

Name of the Course: BCA			
Subject: Leadership			
Course Code: GE3B-03		Semester: 3 rd	
Duration: 60 Hrs		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial:1		Continuous Assessment: 30	
Practical:0		Practical Sessional internal continuous evaluation: NA	
Credit:6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	To Raise one’s own self-awareness		
2.	To Gain self-confidence for a better leadership		
3.	To Develop relational skills, self-knowledge and self-awareness		
Objective: Throughout the course, students will be expected to discover a new approach to leadership based on trust andsense.			
Sl. No.			
1.	To discover a new approach to leadership based on trust and sense.		
2.	To develop greater self-awareness by developing a leadership self-portrait and going through fun activities to increase your empathy and communication.		
Pre-Requisite:			
Sl. No.	Basic Knowledge of English Communication		
Contents			6 Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Understanding Leadership Defining Leadership; Global Leadership Attributes; Practicing Leadership.	8	10
02	Recognizing Your Traits Historical Leaders; What Traits Do These Leaders Display? Leadership Studies: What Traits Do Effective Leaders Exhibit?	6	10

03	Engaging People's Strength Explore how strengths can make one a better leader. Understand the concept of strength; Describe the historical background of strengths-based leadership. Examine how to identify strengths; Review measures used to assess strengths; Examine strengths-based leadership in practice.	10	10
04	Attending to Tasks and Relationships Task and Relationship Styles Explained; Task and Relationship Styles in Practice	6	6
05	Developing Leadership Skills Understanding administrative skills and their use in practice. Understanding interpersonal skills and their use in practice. Understanding conceptual skills and their use in practice	6	10
06	Creating a Vision Understand the characteristics of a vision. Examine the process of vision articulation; Discuss vision implementation; Focus on how to develop a workable vision for different contexts	6	6
07	Addressing Ethics in Leadership Ethical Leadership is about the following: the Character of the Leader, Action of the Leader, Goals of Leader, Honesty of the Leader, Power of the Leader, Value of Leader	4	9
08	Overcoming Obstacles Discuss the concept of obstacles in the workplace. Discuss obstacles in practice. Highlight seven major obstacles derived from path-goal theory of motivation. Describe each obstacle and the various ways leaders can respond to these obstacles	10	9
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	60	100
Assignments: Based on the curriculum as covered by subject teacher.			

List of Books**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
James Kouzes& Barry Posner	The Leadership Challenge: How to Make Extraordinary Things Happen in Organizations		
Northouse, P. G	Introduction to Leadership: Concepts and Practice (3rd ed.)		
Reference Books:			
John Wooden & Steve Jamison	Wooden on Leadership		

Name of the Course: BCA			
Subject: Professional Communication			
Course Code: GE3B-04		Semester: 3rd	
Duration: 60 Hrs		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial:1		Continuous Assessment: 30	
Practical:0		Practical Sessional internal continuous evaluation: NA	
Credit:6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	The aim of this course is to communicate more effectively at work		
2.	The objective of this course is to improve your communication skills, and the most successful strategies for using them to your advantage.		
Objective: Throughout the course, students will be able to understand what others want, respond strategically to their wants and needs, craft convincing and clear messages, and develop the critical communication skills you need to get ahead in business and in life.			
Sl. No.			
1.	This course helps to how to develop trust, the best method of communication for negotiation, and how to apologize		
2.	This course will help to write and speak in English in both social and professional interactions, and learn terminology.		
Pre-Requisite:			
Sl. No.			
1.	Basic Knowledge of English Communication		
Contents			6 Hrs./week
Chapte r	Name of the Topic	Hours	Marks
01	Introduction to Soft Skills– Hard skills & soft skills – employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs	13	14
02	Self-Introduction-organizing the material – Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice– – presenting the visuals effectively – 5 minute presentation	13	14
03	Introduction to Group Discussion— Participating in group discussions – understanding group dynamics – brainstorming the topic — questioning and clarifying –GD strategies- activities to improve GD skills	13	14
04.	Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews	13	14
05.	Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management- developing a long-term career plan-making career changes	4	14
	Sub Total:	56	70
	Internal Assessment Examination & Preparation of Semester	4	30
	Examination		
	Total:	60	100

Assignments:

Based on the curriculum as covered by subject teacher.

List of Books Text**Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
A. K. Jain and A. M. Sheikh	Professional Communication Skills	Eighth Revised Edition	Schand
Meenakshi Raman and Sangeetha Sharma	Technical Communication: Principles and Practice	2nd Edition, Oxford University Press,	
Reference Books:			
Raman Sharma	Technical Communications		Oxford Publication

Name of the Course: BCA			
Subject: E-Learning			
Course Code: GE3B-05		Semester: II	
Duration: 60 Hours		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial: 1		Continuous Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation: NA	
Credit: 6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1	To understand all elements of E-Learning		
2	To make students aware of current situation in various E-Learning platform.		
Objective:			
Sl. No.			
1	To offer students learn through E-Learning.		
2	Understand the drivers and enablers of Industry 4.0		
3	Understand the opportunities, challenges brought about by digital media.		
4	To understand concepts of digital transformation and its application in education.		
Pre-Requisite:			
Sl. No.			
1	Basic knowledge of computer and internet.		
2	Should be aware of current situation in various industry vertices.		
Contents			
Chapte r	Name of the Topic	Hours	Marks
01	Module 1: What Is E-Learning? Types of E-Learning, Advantages and Disadvantages of Asynchronous E-Learning, Elements of an E-Learning Course	9	10
02	Module 2: Developing an E-Learning Strategy, The Strategic Plan, Cost-Benefit Analysis, Generating Support	8	10
03	Module 3: Managing an E-Learning Project, The Project Management Model and the ADDIE Model, Define the Project, Plan the Project, Implement, Monitor, and Adjust the Project, Evaluate the Project, Budgeting, Resources, Timelines and Development Ratios, Working With Vendors	8	10
04	Module 4: Tools of the Trade, Authoring Tools, Element Tools, Assessments, Audio and Video	8	10
05	Module 5: The Analysis Phase, Business Analysis, Audience Analysis, Technology Analysis	6	10
06	Module 6: The Design Phase: Broad Strategies, E-Learning and Instructional Design, Developing Objectives, Structuring the Content, Instructional Strategies, Selecting the Best Format, Special E- Learning Considerations: Standards and Compliance, Testing and Assessments Media, InterfaceandNavigation, The Design Document	8	10

07	Module 7: The Development Phase: Writing the Course, Working With Storyboards, Elements of Storyboards, Storyboard Templates, Organizing Your Content, Converting Existing Content, The Development Phase: Putting the Course Together, Rapid Prototyping, Rapid Development, Paper Review Cycles, Assembling the Course, On-Screen Review Cycles		5	5
08	Module 8: The Implementation Phase, Preparing the Audience, Ongoing Management, The Evaluation Phase Level 1 Evaluation: Learner Reaction, Level 2 Evaluation: Learning, Levels 3–5 Evaluation: Impact, Moving Forward, Find Your Path Keep Learning		4	5
	Sub Total:		56	70
	Internal Assessment Examination & Preparation of Semester Examination		4	30
	Total:		60	100
Name of Author		Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Diane Elkins & Desirée Pinder		E-Learning Fundamentals	ISBN: 9781562869472	ATD Press 2015-06-30
Reference Books:				
Michael W. Allen	Designing Successful e-Learning	ISBN 10: 1118038312 ISBN 13: 9781118038314 Print ISBN: 9780787982997		Wiley Professional Development (P&T) 5/11/07

GE Baskets for CBCS structure programs (2020-21)

Basket No	GE Basket	Course Code	Course Name
Basket 4	EMERGING TECH, INNOVATION & ENTREPRENEURSHIP	GE4B-01	Data Analysis with R
		GE4B-02	Guidance of Excel for office Assistance
		GE4B-03	Machine Learning with Python
		GE4B-04	Entrepreneurship Principles
		GE4B-05	E-Commerce & M-Commerce

Course Name: Data analysis with R

Course Code: GE4B-01

Total Hours- 60 Hours

Credits: 6

Course Objectives: The course has been designed to explore the R programming language; understand the different constructs it uses. The concept of data and data analysis and using R programming to perform basic statistical data analysis. You will learn how to install and configure software necessary for a statistical programming environment and describe generic programming language concepts as they are implemented in a high-level statistical language.

Sl.	Course Outcome	Mapped modules
1	Understanding the background and history of R	M1
2	Understanding the nuts and bolts of R	M2
3.	Understanding concept of basic programming in R	M3,M4
4	Understanding loops in R	M4
5	Understanding functions and Debugging in R	M5,M6
6.	Understanding simulation and profiling in R	M6

Module	Content	Total Hour s	%ageof Questio ns	Blooms Level (if applicable)
M1	Background, Getting Started	5	5	1
M2	Basics of R programming	12	30	1,2,3
M3	Subsetting	10	15	1,2,3
M4	Control structures and Functions	18	30	1,2,3
M5	scoping rules and Loop functions	10	15	1,2,3
M6	Debugging tools,simulation and profiler	5	5	1,2
		60	100	

Detailed Syllabus:

Module 1:

Getting started, Background: Installing R on Windows, Writing Code / Setting Your Working Directory (Windows), Overview and History of R, R Console Input and Evaluation,

Module 2:

Data Types - R Objects and Attributes, Vectors and Lists, Matrices, Factors, Missing Values, Data Frames, Names Attribute, Reading Tabular Data, Reading Large Tables, Textual Data Formats, Interfaces to the Outside World.

Module 3:

Subsetting– Basic, Lists, Matrices, Partial Matching, Partial Matching, Removing Missing Values, Vectorized Operations. Working with swirl.

Module 4:

Control structures: If-else, For loops, While loops, Repeat, Next, Break.

Functions: user defined functions, anonymous functions.

Module 5:

Scoping Rules- Symbol Binding, R Scoping Rules, Optimization Example, Coding Standards.

Dates and Times

Module 6:

Loop Functions - lapply, Loop Functions – apply, Loop Functions –mapply, Loop Functions –tapply, Loop Functions - split

Debugging Tools- Diagnosing the Problem, Basic Tools, Using the Tools The str Function

Simulation- Generating Random Numbers, Simulating a Linear Model, Random Sampling, R Profiler.

List of Experiments:

1. Installing R and R studio
2. Programs using data types
3. Programs using concept of subsetting
4. Programs using control structures
5. Programs using scoping rules
6. Program using loop functions
7. Using debugging tools.

Suggested Readings:

- ☐ R for Data Science Hadley Wickham, Garrett Grolemund, O'REILLY
- ☐ R Programming for Beginners Paperback, Sandip Rakshit, McGrawhill
- ☐ R Programming for Data Science Roger D. Peng <https://leanpub.com/rprogramming>

Course Name: Guidance of Excel for Office Assistance

Course Code: GE4B-02

Total Hours- 60 Hours

Credits: 6

Course Objectives: Spreadsheet software is one of the most ubiquitous pieces of software used in workplaces across the world. Learning to confidently operate this software means adding a highly valuable asset to employability portfolio. During this course we are going to get the concept of Excel user interface, perform basic calculations with formulas and functions, professionally format spreadsheets, font formatting, borders, alignment, number formatting, as well as the Excel styles and themes, find data with Filter and Sort, retrieve and change data using Find and Replace, and use Conditional Formatting to highlight specific data perform validation use of what-if analysis by using goal seek and solver and create visualizations of data through charts and graphs creating, formatting and managing tables and then move on to sorting and filtering tables to get the data. After having the knowledge in detail people will be able to expertly navigate the Excel user interface, perform basic calculations with formulas and functions, professionally format spreadsheets, and create visualizations of data through charts and graphs.

Sl	Course Outcome	Mapped modules
CO1	Understanding Excel Interface, Terminologies, Formulas and Functions	M1
CO2	Understanding to work with data, Different kinds of formatting,	M2
CO3	Understanding creating charts, filter , sort, Find and replace	M3
CO4	Understanding to work with multiple workbook, Text and Date Function	M4
CO5	Understanding to use named range	M5
CO6	Understanding to summarize the data, use of sum, countif function, advance chart	M6

Module	Content	Total Hours	%age of questions	Blooms Level (if applicable)
Module 1	foundational features of Excel, user interface	6	10	1
Module 2	Define several formatting tools with filter and sort.	10	10	2
Module 3	Define steps to print with header and footer. Apply of different chart.	10	20	2.3
Module 4	Define all about working with multiple worksheets and workbooks. Date and Text function to fulfill specific business requirements.	11	10	2
Module 5	Learn how to create, manage and apply Named Ranges to enhance calculations. Define different advanced formulas	15	25	2.3
Module 6	Start with creating, formatting and managing tables. Learn how to create and modify them to solve a variety of business problems.	8	25	1,2,3
		60	100	

<p>Module 1-Define foundational features of Excel, user interface, basic Excel terminology Introduction to formulas and functions - and understand the different cell references.</p>
<p>Module 2-Define several formatting tools like font formatting, borders, alignment, number formatting, as well as the Excel styles and themes. Learn to manage your spreadsheets – find data with Filter and Sort, retrieve and change data using Find and Replace, and use Conditional Formatting to highlight specific data.</p>
<p>Module 3-Define the steps to print the worksheet. Learn how you can optimize spreadsheet for printing by managing margins, orientation, headers & footers, and more. Apply chart on numerical data and use of different chart formatting</p>
<p>Module 4-Define all about working with multiple worksheets and workbooks. Learn how to combine data, manage datasets and perform calculations across multiple sources. Define the use of Date and Text functions. Show the way to extract information and manipulate data to fulfill specific business requirements.</p>
<p>Module 5-Learn how to create, manage and apply Named Ranges to enhance calculations. Define different advanced formulas in this module. Learn how you use functions like COUNTIFS to extract information from data, as well as generate graphical representations of it.</p>
<p>Module 6-Start with creating, formatting and managing tables use of sorting and filtering. Use of pivot tables. Learn how to create and modify them to solve a variety of business problems. Gain skills to create interactive dashboards with pivot charts and slicers.</p>

List of Experiment:

- 1) Understand the Excel interface apply different formulas and functions on data.
- 2) Create Excel sheet to apply different kinds of formatting
- 3) Create Excel sheet for display the use of different kinds of chart.
- 4) Create Excel sheet to define name range to selected cells and use of name range in different formulas.
- 5) Create Excel sheet to display the use of advance chart and different categories of function.

Suggested Reading:

1. Excel 2016 Bible, by John Walkenbach
2. Excel 2016 for Dummies, by Greg Harvey

Name of the Course: BCA			
Subject: Machine Learning using Python			
Course Code: GE4B-03		Semester: 4th	
Duration: 60 Hours		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 5		End Semester Exam: 70	
Tutorial: 1		Continuous Assessment: 30	
Practical: 0		Practical Sessional internal continuous evaluation: NA	
Credit: 6		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1	To build new and/or leverage existing algorithms to learn from data		
2	To build generalizable models that give accurate predictions		
3	To find patterns, particularly with new and unseen similar data		
4	Analyze and make data-driven recommendations and decisions based on only the input data.		
Objective:			
Sl. No.			
1	discover patterns in your data		
2	make predictions based on often complex patterns to answer business questions		
3	detect and analyses trends and help solve problems.		
4	largely encompassing mathematical optimization, probability, and statistics.		
Pre-Requisite:			
Sl. No.			
1.	Knowledge of Python Programming Language		
2.	You must be comfortable with variables, linear equations, graphs of functions, histograms, and statistical means		
Course Outcome:			
1.	Gain knowledge about basic concepts of Machine Learning, Identify machine learning techniques suitable for a given problem.		
2.	Solve the problems using various machine learning techniques		
3.	Apply Dimensionality reduction techniques		
4.	Design application using machine learning techniques		
Contents			
Modules	Serial of Modules	Hours	CO Mapping
Module 1: Introduction	Why Machine Learning? Problems Machine Learning Can Solve, Why Python? A First Application: Classifying Iris Species, Measuring Success: Training and Testing Data, Building Your First Model: k-Nearest Neighbors, Making Predictions, Evaluating the Model	10	CO1
Module 2: Supervised Learning	Classification and Regression, Generalization, Overfitting, and Underfitting , Relation of Model Complexity to Dataset Size, Supervised Machine Learning Algorithms, k-Nearest Neighbors , Naive Bayes Classifiers , Decision Trees, Neural Networks (Deep Learning), The Decision Function, Predicting Probabilities	20	CO2, CO3

Unsupervised Learning and Preprocessing	Types of Unsupervised Learning, Challenges in Unsupervised Learning, Different Kinds of Pre-processing, The Effect of Pre-processing on Supervised Learning, Dimensionality Reduction, Feature Extraction, and Manifold Learning Clustering k-Means Clustering, Agglomerative Clustering, DBSCAN Comparing and Evaluating Clustering Algorithms		
Module 3: Representing Data and Engineering Features	Types of Unsupervised Learning, Categorical Variables, Automatic Feature Selection, Model-Based Feature Selection, Iterative Feature Selection, Utilizing Expert Knowledge	20	CO3, CO4
Wrapping Up	Approaching a Machine Learning Problem, Ranking, Recommender Systems, and Other Kinds of Learning, Probabilistic Modeling, Inference, and Probabilistic Programming, Neural Networks		
Module 4: Working with Text Data	Types of Data Represented as Strings, Example Application: Sentiment Analysis of Movie Reviews, Representing Text Data as a Bag of Words, Stopwords, Rescaling the Data with tf-idf, Advanced Tokenization, Stemming, and Lemmatization, Topic Modeling and Document Clustering, Latent Dirichlet Allocation	10	CO4
	Total:	60	
Assignments: Based on the curriculum as covered by the subject teacher. List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Andreas C. Müller & Sarah Guido	Introduction to Machine Learning with Python	9781449369415	O'Reilly Media, Inc.
Reference Books:			
Manaranjan Pradhan	Machine Learning using Python		Wiley

CO & PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
GE4B-03 CO1	M	S	M									
GE4B-03 CO2		M	S	M								
GE4B-03 CO3		M	S	S								
GE4B-03 CO4					M							

Entrepreneurship Principles

Course Code: GE4B-04

Total hours: 60 Hours

Course Outcomes: This course has been designed to enable students understand, apply and manage the various aspects of entrepreneurship activities. The readings will provide an understanding of a pathway to successfully setting up entrepreneurship operations in their future endeavour.

Sl. No.	Course Outcome	Mapped Modules
1	The learner can relate and demonstrate the Entrepreneurship – Concept, Functions, Need and Importance	M1
2	Be able to outline the concept of Entrepreneurs, Competencies and characteristics	M2
3	Be able to utilize Self-Assessment of Qualities, Skills, Resources and Dreams	M2, M3
4	Be able to analyse the Business Idea and Concept, Types of Business, Manufacturing, Trading and Services	M2, M4, M5
5	Be able to explain Entrepreneurs as problem solvers. Innovations and Entrepreneurial Ventures	M2, M3, M5

Modules	Contents	Total Hours	% of Questions	Blooms Level
M1	Entrepreneurship – Concept, Functions, Need and Importance	12	25	1
M2	Types of Entrepreneurs, Competencies and characteristics	12	25	1,2
M3	Self-Assessment of Qualities, Skills, Resources and Dreams	12	15	2, 3
M4	Business Idea and Concept, Types of Business, Manufacturing, Trading and Services	14	25	2, 3
M5	Entrepreneurs as problem solvers. Innovations and Entrepreneurial Ventures	10	10	3, 4
	Total	60	100	

Detailed Syllabus:

Module :1

Entrepreneurship – Concept, Functions, Need and Importance – The Concept of Entrepreneurship, the functions of Entrepreneurship, Need and Importance of Entrepreneurship, Theories of Entrepreneurship, Role and importance of Entrepreneur in economic growth, Process involved in the build-up towards Entrepreneurship, Various kinds of Start-up and its stages, Entrepreneurship concepts in the Indian Scenario

Module :2

Types of Entrepreneurs, Competencies and characteristics: Entrepreneurial Motivation, Need for Achievement Theory, Risk-taking Behaviour, Innovation and Entrepreneur, Types of Entrepreneurs, Competencies, Ethics and characteristics of Entrepreneur, Entrepreneurial Values and Attitudes, Motivation Mind-set of an employee and an entrepreneur, Importance of Entrepreneur in any organisation

Module: 3

Self-Assessment of Qualities, Skills, Resources and Dreams: New Ventures, Industrial Park (Meaning, Features, & Examples) , Special Economic Zone (Meaning, Features & Examples) Financial Assistance by Different Agencies , Small Scale Industries, The Small Industries Development Bank of India(SIDBI) , The State Small Industries Development Corporation (SSIDC), Business Ideas vs. Business Opportunities, Opportunity Assessment factors, Micro and Macro Market Environment Feasibility Study, Business Plan Preparation, Execution of Business Plan, Role of networking in entrepreneurship

Module 4

Business Idea and Concept, Types of Business, Manufacturing, Trading and Services: – Business Idea and Concept, Types of Business: Manufacturing, Trading and Services. Stakeholders: sellers, vendors and consumers and Competitors Market Research, Concept, Importance and

Process, Market Sensing and Testing, Business Model, Proof of Concept, Pricing and Factors affecting pricing, Launch Strategies after pricing and proof of concept

Module: 5

Entrepreneurs as problem solvers. Innovations and Entrepreneurial Ventures: Entrepreneurs - as problem solvers. Innovations and Entrepreneurial Ventures, Global and Indian New Industries of New Age Economy, Role of Technology, E-commerce and Social Media Social Entrepreneurship as Problem Solving, Concept and Importance Risk Taking-Concept; types of business risks.

Suggested Readings:

1. Robert Tuchman, Young Guns: The Fearless Entrepreneur's Guide to Chasing Your Dreams and Breaking out on Your Own, American Management Association, 2009
2. David S. Landes; Joel Mokyr; William J. Baumol, The Invention of Enterprise: Entrepreneurship from Ancient Mesopotamia to Modern Times, Princeton University Press, 2010
3. Philip Auerswald, The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy, Oxford University Press, 2012
4. David A. Harper, Foundations of Entrepreneurship and Economic Development Routledge, 2003
5. Janet Kiholm Smith; Richard L. Smith; Richard T. Bliss, Entrepreneurial Finance: Strategy, Valuation, and Deal Structure, Stanford Economics and Finance, 2011
6. Edward D. Hess, Growing an Entrepreneurial Business: Concepts and Cases, Stanford Business Books, 2011
7. Edward D. Hess, Grow to Greatness: Smart Growth for Entrepreneurial Businesses, Stanford Business Books, 2012

Course Code: GE4B-05

Course: E-Commerce & M-Commerce

Credit-6

Total hours: 60 Hours

Course Objective:

1. To understand the basic concepts and technologies used in the E-commerce and M-commerce.
2. To develop knowledge about challenges, security issues from business perspective in the E-commerce and M-commerce domain.
3. To familiarize students with HLML and CSS.

Sl	Course Outcome	Mapped modules
1	Remembering	M1, M2, M3, M4, M5, M6, M7
2	Understanding the course	M1, M2, M3, M4, M5, M6, M7
3	Applying the general problem	M3, M4, M6
4	Analyse the problems	M3, M4, M6
5	Evaluate the problems after analysing	
6	Create using the evaluation process	M7

Module Number	Content	Total Hours	%age of questions	Bloom's Level (if applicable)	Remarks (If any)
M1	E-Business Framework	8		L1, L2	
M2	Network Infrastructure for E-Commerce.	6		L1, L2	
M3	E-Business: Requirements and Architecture.	6		L1, L2, L3, L4	
M4	Security in Electronic Business.	6		L1, L2, L3, L4	
M 5	E-marketing	6		L1, L2	
M6	Mobile-Commerce	8		L1, L2, L3, L4	
M7	HTML	10 P		L1, L2	
		60	100		

Sl.	Topic/Module	Hour
1.	Module 1: E-Business Framework: Definition of E-Business, Origin of E-Business, History of the Internet, E-Business Opportunities for Businesses, Working of E-Business, E-Business Vs the Traditional Business Mechanism, Advantages of E-Business, Disadvantages of E-Business, Main Goals of E-Business.	5
2.	Module 2: Network Infrastructure for E-Commerce – I: Local Area Network (LAN), Ethernet: IEEE 802.3: Local Area Network (LAN) Protocols, Wide Area Network (WAN), The Internet, TCP/IP Reference Model, Domain Names, Hyper Text Markup Language (HTML), Simple Exercises in HTML.	5
3.	Module 3: E-Business: Requirements and Architecture: Requirements of E-Business, Functions of E-Business, E-Business Framework Architecture, I-way or Information Highway. Business Models: Evolution of Internet Business Models, Business Models in Practice, Business Model: The Six Components.	5
4.	Module 4: Security in Electronic Business: Intranet and Extranet Security: Threats and Protection, Protection Methods, Data and Message Security, Firewalls. Encryption: Cryptography, Encryption, Digital Signature, Virtual Private Network.	5
5.	Module 5: E-Marketing: Challenges of Traditional Marketing, Retailing in E-Business Space, Internet Marketing, Advertisement and Display on the Internet, E-Business for Service Industry. EDI, E-CRM and E-SCM: Electronic Data Interchange (EDI), E-CRM, E-SCM	5
6.	Module 6: Mobile Commerce: Overview of M-Commerce - Wireless Application Protocol (WAP), Generations of Mobile Wireless Technology, Components of Mobile Commerce, Networking Standards for Mobiles.	5
7.	Module 7: HTML: Creating web pages using HTML tags, elements, basic and advanced text formatting, multimedia components, designing web pages, document layout, Lists, Tables, Hyperlinks, Working with frames, forms, controls etc.	15
8.	Module 8: Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute selector), CSS Color , Creating page Layout and Site Designs.	15

Suggested Readings:

1. Joseph, P.T. (2005). E-Commerce an Indian Perspective (2e), New Delhi Prentice-Hall of India
2. Kaspersky, (2008). The Cybercrime Ecosystem Whitepaper, Kaspersky Lab
3. O'Brien, J. (2004). Management Information Systems Managing Information Technology in The Business Enterprise, New Delhi Tata McGraw-Hill.
4. Rayport, J. F. & Jaworski, B. J. (2002). Introduction to E-Commerce, New York McGraw-Hill Irwin.
5. Stair, R. M. & Reynolds, G. W. (2001). Principles of Information Systems, 5e, Singapore Thomson Learning.
6. Ramesh Bangia: Learning HTML, Khanna Book Publishing Company.
7. Powell Thomas: HTML & CSS: The Complete Reference: McGraw Hill Education India.
8. Elisabeth Robson and Eric Freeman: *Head First HTML and CSS*: Packt.