BIRLA INSTITUTE OF TECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) CURRICULUM

(Effective from Academic Session: Monsoon 2018)

BACHELOR IN COMPUTER APPLICATION

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Institute Vision

To become a Globally Recognised Academic Institution in consonance with the social, economic and ecological environment, striving continuously for excellence in education, research, and technological service to the National needs.

Institute Mission

- To educate students at Under Graduate, Post Graduate, Doctoral, and Post-Doctoral levels to perform challenging engineering and managerial jobs in industry.
- To provide excellent research and development facilities to take up Ph.D. programmes and research projects.
- To develop effective teaching learning skills and state of art research potential of the faculty.
- To build national capabilities in technology, education, and research in emerging areas.
- To provide excellent technological services to satisfy the requirements of the industry and overall academic needs of society.

Department Vision:

The department strives to be recognized globally for outstanding education and research, leading to excellent professionals and innovators in the field of Computer Science and Engineering, who can positively contribute to the society.

Department Mission

1. To impart quality education and equip the students with strong foundation that could make them capable of handling challenges of the new century.

2. To maintain state of the art research facilities and facilitate interaction with world's leading universities, industries and research organization for constant improvement in the quality of education and research.

Graduate Attributes

1. **Engineering Knowledge**: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

2. **Problem Analysis**: Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

3. **Design/ Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

4. **Conduct investigations of complex problems** using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

5. **Modern Tool Usage**: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and Society**: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

7. **Environment and Sustainability**: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with 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.

11. **Project Management and Finance**: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long Learning**: Recognize the need for and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change.

Programme Educational Objectives (PEOs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

(A) Programme Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with 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.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

(B) Programme Specific Outcomes (PSOs)

13. The ability to analyze, design, code and test application specific or complex engineering problems in Cryptography and Network Security, Design and Analysis of Algorithm, Computer Networks, Cloud Computing, Mobile Computing, Data Mining and Big Data by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.
14. The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning.
15. Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

PROGRAMME COURSE STRUCTURE (ALL SEMESTERS)

BIRLA INSTITUTE OF TECHNOLOGY- MESRA, RANCHI NEWCOURSE STRUCTURE - To be effective from academic session 2018-19 Based on CBCS & OBE model Recommended scheme of study (BACHELOR OF COMPUTER APPLICATIONS)							
Semester/ Session of Study (Recomended)	**Course Level**	**Course Code**	**Courses**	**Mode of delivery & credits** *L-Lecture; T-Tutorial;P-Practicals*			**Total Credits** *C-Credits*
				L (*Periods/ week*)	**T (*Periods/ week*)**	**P (*Periods/ week*)**	**C**
		THEORY					
FIRST Monsoon	**FIRST**	CA101	Problem Solving and Programming in C	3	0	0	3
		CA103	Logical Organizations of Computers	3	1	0	4
		MT124	Business Communication Basics	2	0	0	2
		CE101	Environmental Science	2	0	0	2
		CA104	Mathematics-I (Elementary Mathematics)	3	0	0	3
		LABORATORIES					
	FIRST	CA102	Problem Solving and Programming in C Lab	0	0	4	2
		PE(SEC-I)	Paper-I (Skill Enhancement Course)	0	0	4	2
TOTAL							**18**

SECOND Spring		**THEORY**					
	FIRST	CA155	Data Structures	3	1	0	4
		CA157	Discrete Structures	3	0	0	3
		CA160	Operating System Concepts	3	0	0	3
		CA158	Numerical and Statistical Methods	3	0	0	3
		LABORATORIES					
	FIRST	CA156	Data Structures Lab	0	0	4	2
		CA161	Operating System Lab	0	0	4	2
		CA159	Numerical and Statistical Methods Lab	0	0	4	2
		PE(SEC-II)	Paper-II (Skill Enhancement Course)	0	0	4	2
TOTAL							**21**
THIRD Monsoon		**THEORY**					
	SECOND	CA201	Object Oriented Programming using Java	3	0	0	3
		CA203	Database Management Systems	3	1	0	4
		**	Program Elective- I	3	1	0	4
		LABORATORIES					
	SECOND	CA202	OOP in Java Lab	0	0	4	2
		CA204	DBMS Lab	0	0	4	2
		**	PE1 Lab	0	0	4	2
		PE(SEC-III)	Paper-III (Skill Enhancement Course)	0	0	4	2
TOTAL							**19**

FOURTH Spring			**THEORY**				
	SECOND	CA255	Fundamentals of Computer Algorithms	3	1	0	4
		CA256	Web Programming	3	0	0	3
		CA258	Software Engineering	3	0	0	3
		**	Program Elective- II	3	1	0	4
		LABORATORIES					
	SECOND	CA257	Web Programming Lab	0	0	4	2
		CA259	Software Engineering Lab	0	0	4	2
		**	PE-II Lab	0	0	4	2
TOTAL							**20**
FIFTH Monsoon			**THEORY**				
	THIRD	CA301	Computer Graphics and Multimedia	3	0	0	3
		CA303	Computer Networks	3	0	0	3
		CA304	Management Information Systems	3	0	0	3
	SECOND	PE-III	Program Elective -III	3	0	1	4
	THIRD	PE-IV	Program Elective -IV	3	0	0	3
		LABORATORIES					
	THIRD	CA302	Computer Graphics Lab	0	0	4	2
	SECOND	**	PE-III Lab	0	0	4	2
	THIRD	PE(SEC-IV)	Paper-IV (Skill Enhancement Course)	0	0	4	2
TOTAL							**22**

SIXTH Spring			**THEORY**				
	THIRD	CA355	Data Mining	3	0	0	3
		CA356	Distributed Computing	3	0	0	3
	THIRD	**	Program Elective -V	3	1	0	4
	THIRD	**	Program Elective-VI	3	1	0	4
		CA360	Project	0	0	0	6
TOTAL							**20**
TOTAL PROGRAM CREDITS							**120**
LIST OF PROGRAM ELECTIVES							
PE/LEVEL		**Code No**	**Courses**	**Mode of delivery & credits** *L-Lecture; T-Tutorial;P-*			**Total Credits**
				L (*Periods/ week*)	**T *(Periods/ week)***	**P *(Periods/ week)***	**C**
2	**PEI**	CA220	Internet Technologies	3	1	0	4
2		CA221	Internet Technologies Lab	0	0	4	2
2		CA222	Mobile Application(MA)	3	1	0	4
2	**PEII**	CA223	Ecommerce Technology	3	1	0	4
2		CA271	Soft Computing and Applications	3	1	0	4
2		CA272	Soft Computing Lab using MATLAB/SCI Lab	0	0	4	2
		CA 273	Data Analytics	3	1	0	4
		CA 274	Data Analytics Lab using R Language	0	0	4	2
2	**PEIII**	CA224	Cloud Computing	3	1	0	4
2		CA275	Android Programming	3	1	0	4
		CA 276	Android Programming Lab	0	0	4	2

2		CA 277	Python Programming	3	1	0	4
2		CA 278	Python Programming Lab	0	0	4	2
3	**PEIV**	CA320	Software Testing	3	0	0	3
3		CA321	Software Testing Lab	0	0	4	2
3		CA322	Network Security	3	0	0	3
3	**PEV**	CA323	Cyber Forensics	3	1	0	4
3		CA325	Unix and Shell Programming	3	1	0	4
3		CA326	Unix and Shell Programming Lab	0	0	4	2
3	**PEVI**	CA327	System Programming	3	1	0	4
3		CA328	Distributed Database Systems	3	1	0	4
3		CA331	Decision Support System	3	1	0	4

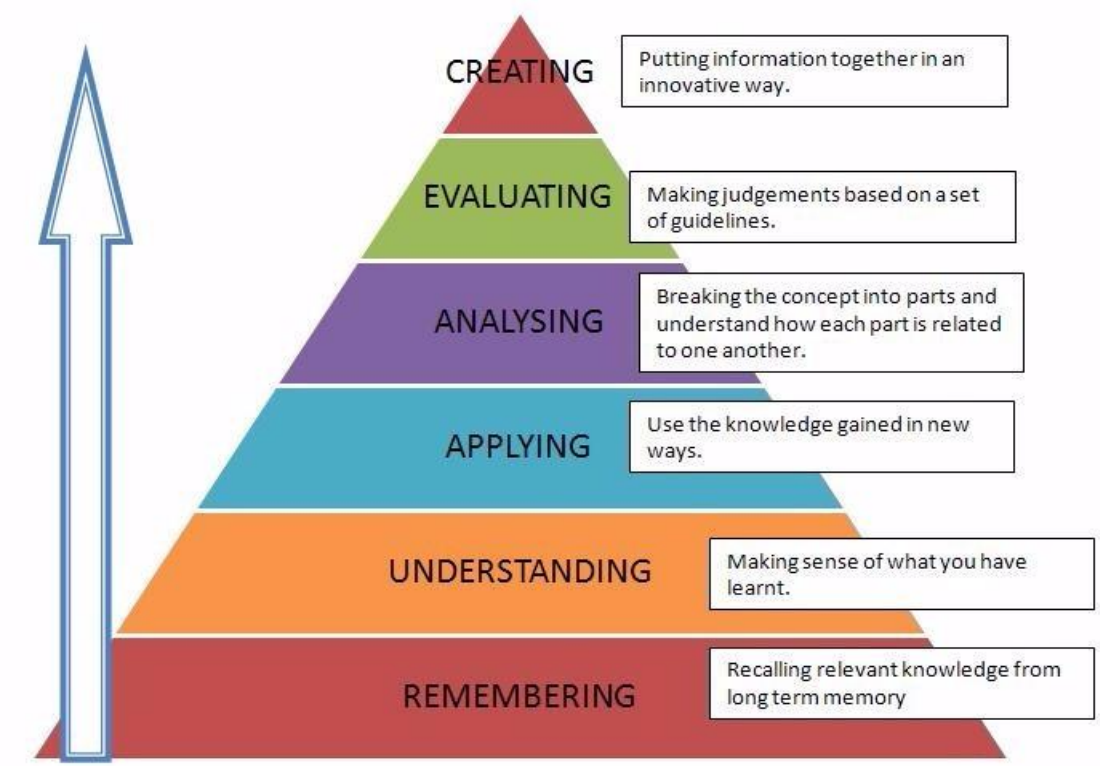
PROGRAM ELECTIVES (LIST OF SKILL DEVELOPMENT COURSES)

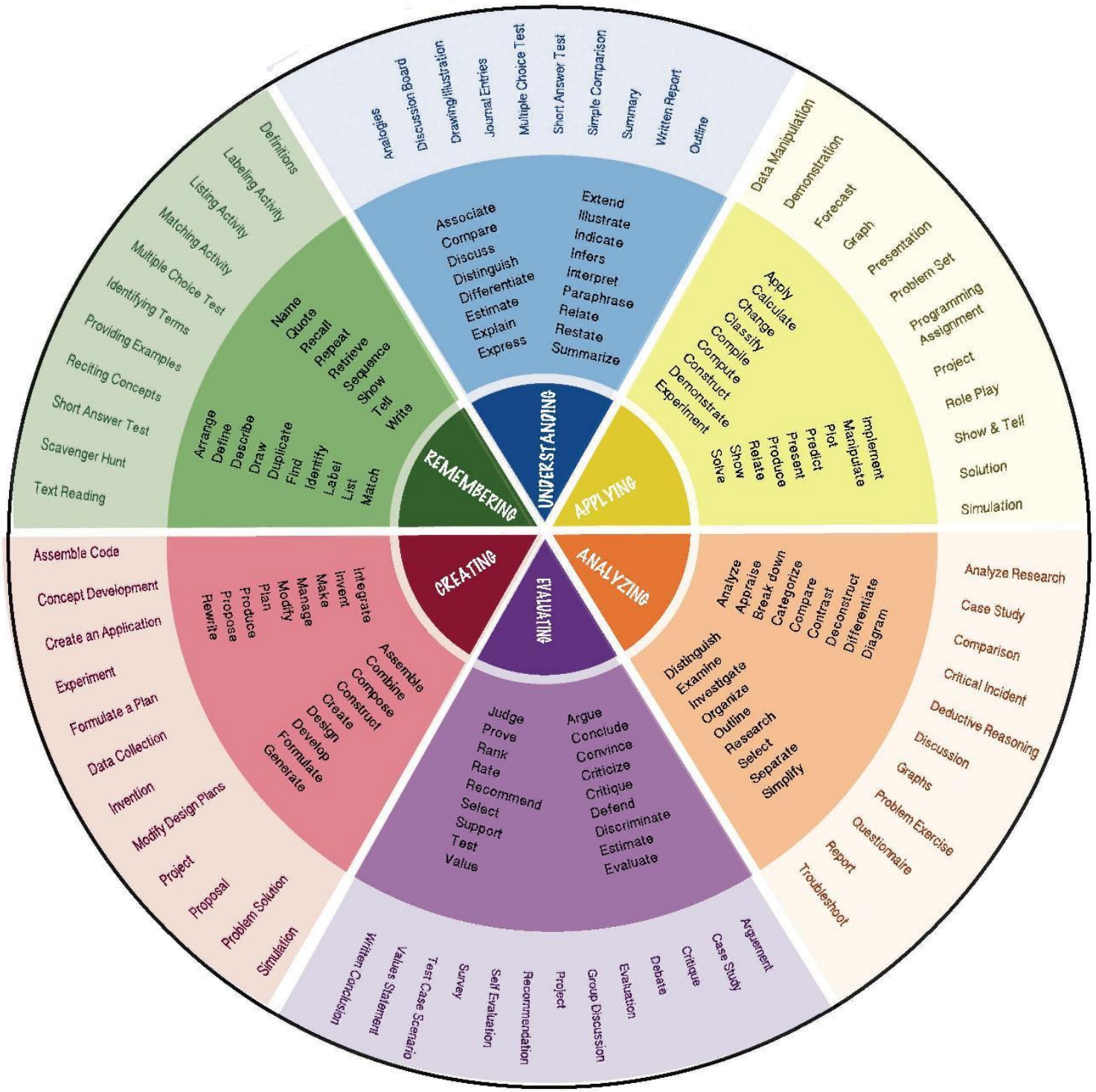
PE/LEVEL		**Code No**	**Subjects**	**Mode of delivery & credits** *L-Lecture; T-Tutorial;P-*			**Total Credits**
				L (*Periods/ week*)	**T *(Periods/ week)***	**P *(Periods/ week)***	**C**
1	**PE(SEC-I)**	CA180	Office Automation Tools	0	0	4	2
1	**PE(SEC-II)**	CA181	Designing and Publishing in Computer Using Page maker, Photoshop and Corel draw	0	0	4	2
2		CA280	HTML Programming	0	0	4	2
2	**PE(SEC-III)**	CA281	Programming in Visual Basic/GAMBAS	0	0	4	2
2		CA284	Programming in SCILAB	0	0	4	2
3	**PE(SEC-IV)**	CA380	Tally Software (Accounting and FinanceTally ERP)	0	0	4	2
3		CA381	Photo Shop Lab	0	0	4	2

BLOOM'S TAXONOMY FOR CURRICULUM DESIGN AND ASSESSMENT:

Preamble

The design of curriculum and assessment is based on Bloom's Taxonomy. A comprehensive guideline for using Bloom's Taxonomy is given below for reference.




REMEMBERING
UNDERSTANDING
APPLYING
ANALYZING
EVALUATING
CREATING
Definitions
Labeling Activity
Listing Activity
Matching Activity
Multiple Choice Test
Identifying Terms
Providing Examples
Reciting Concepts
Short Answer Test
Scavenger Hunt
Text Reading
Name
Quote
Recall
Repeat
Retrieve
Sequence
Show
Tell
Write
Arrange
Define
Describe
Draw
Duplicate
Find
Identify
Label
List
Match
Analogies
Discussion Board
Drawing/Illustration
Journal Entries
Multiple Choice Test
Short Answer Test
Simple Comparison
Summary
Written Report
Outline
Associate
Compare
Discuss
Distinguish
Differentiate
Estimate
Explain
Express
Extend
Illustrate
Indicate
Infers
Interpret
Paraphrase
Relate
Restate
Summarize
Data Manipulation
Demonstration
Forecast
Graph
Presentation
Problem Set
Programming Assignment
Project
Role Play
Show & Tell
Solution
Simulation
Apply
Calculate
Change
Classify
Compile
Compute
Construct
Demonstrate
Experiment
Implement
Manipulate
Pilot
Predict
Present
Produce
Relate
Show
Solve
Analyze Research
Case Study
Comparison
Critical Incident
Deductive Reasoning
Discussion
Graphs
Problem Exercise
Questionnaire
Report
Troubleshoot
Analyze
Appraise
Break down
Categorize
Compare
Contrast
Deconstruct
Differentiate
Diagram
Distinguish
Examine
Investigate
Organize
Outline
Research
Select
Separate
Simplify
Argument
Case Study
Critique
Debate
Evaluation
Group Discussion
Project
Recommendation
Self Evaluation
Survey
Test Case Scenario
Values Statement
Written Conclusion
Argue
Conclude
Convince
Criticize
Critique
Defend
Discriminate
Estimate
Evaluate
Judge
Prove
Rank
Rate
Recommend
Select
Support
Test
Value
Assemble Code
Concept Development
Create an Application
Experiment
Formulate a Plan
Data Collection
Invention
Modify Design Plans
Project
Proposal
Problem Solution
Simulation
Integrate
Invent
Make
Manage
Modify
Plan
Produce
Propose
Rewrite
Assemble
Combine
Compose
Construct
Create
Design
Develop
Formulate
Generate

COURSE INFORMATION SHEET

Course Code: CA101
Course Title: PROBLEM SOLVING AND PROGRAMMING IN C
Pre-requisite(s): Basic Sciences
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	Understand the fundamentals of C programming.
2.	Learn about different problems and the approach to solve them.
3.	Gain proficiency with the fundamental concepts of the C programming Language
4.	Be able to apply these concepts to solve real world problems
5.	Able to program in C programming for a given application

Course Outcomes

After the completion of this course, students will be able to:

CO1	Choose the loops and decision-making statements to solve the problem.
CO2	Implement different Operations on arrays.
CO3	Use functions to solve the given problem.
CO4	Understand pointers, structures and unions.
CO5	Implement file Operations in C programming for a given application.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Problem Solving and Programming Concepts**: Problem Solving in Everyday Life, Types of Problem, Problem Solving with Computers. **Overview of C:** History of C, Importance of C, Structure of C program, Sample of C programs. Constant, Variable and Data types: C Tokens – keywords, identifier, constant, string, and operators, and symbols, Data types – primary data types, user defined data types, and derived data types, Declaration of variables, assign values to variables. **Operators and Expressions:** Different types of operators – arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, bitwise operators, conditional operators and special operators, Arithmetic expressions – precedence of arithmetic operators, Type conversions in expressions. **Managing input and output operations:** Reading a character, Writing a character, Formatted input, Formatted output.	**10**
Module – II **Decision making and Branching:** Decision making with if statement – Simple if statement, The if …. Else statement, Nesting of if …. Else statement, The else if ladder, The switch statement, The ? : Operator, The go-to statement. **Decision making and Looping:** The while statement, The do statement, The for statement, Jumps in loops.	**10**
Module – III **Arrays:** One - dimensional arrays, Declaration of one – dimensional arrays, Two – dimensional arrays, Declaration of two – dimensional arrays, Multi – dimensional arrays. **Character Arrays and String:** Declaring and initializing string variables, Reading string from terminal, Writing string to screen, Putting string together, Comparison of two strings, String handling functions, Other features of strings.	**7**
Module – IV **User defined functions:** A multi – function program, Definition of	**8**

function, Function calls, Function declaration, Category of functions, Nesting of functions, Recursion, Passing arrays to functions, Passing strings to functions	
Module – V **Structures and Unions**: Defining a structure, Declaring structure variables, Accessing structure members, Arrays of structures, Arrays within structures, Structures within structures, Structures and functions, Union. **Pointers:** Understanding pointers, Accessing the address of a variable, Declaring pointer variables, Pointer expressions, Array of pointers, Pointers to function, Pointers and structures. **File Management:** Defining and opening a file, Closing a file, Input/Output operations on files, Error handling during I/O operations	**5**

Text Books:

1. Balagurusamy E., "Programming in ANSI C", 5th Edition, TMH, 2010.**(T1)**
2. Sprankle M., "Problem Solving and Programming Concepts", 7th Edition, Pearson Education, New Delhi, 2006.**(T2)**

Reference Books:

1. Gottfried B. S., "Programming with C", Schaum Series, McGraw Hill, 2005. **(R1)**
2. Kanetkar Y., "Let us C", 4th Edition, BPB publication, New Delhi, 2002.**(R2)**

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5

End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping Between COs and Course Delivery (CD) methods

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1				2	2	3	2
CO2	3	3	3	1	3	1	1	1				2	2	2	2
CO3	3	3	3	3	3	1	2	2		1	1	2	2	3	2
CO4	3	3	3	1	3		1	1		1	1	2	2	3	2
CO5	3	3	3	3	3	1	1	1	1	1	1	2	2	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD Code	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD7, CD 8
CD2	Tutorials/Assignments	CO2	CD1 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD3
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA103
Course Title: LOGICAL ORGANIZATIONS OF COMPUTERS
Pre-requisite(s): Basic Electronics
Co- requisite(s):
Credits: 4 L:3 T:1 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	Understand the Truth Table.
2.	Identify the number of variables and their simplification importance.
3.	Understand different circuits for the implementation of Boolean equations.
4.	Identify Register Transfer, Micro-operations and Central Processing Unit
5.	Describe performance evaluation of computers, computer architecture and organization, computer arithmetic, Memory and CPU design.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Minimize the circuit diagrams by use of K-Map concepts and Boolean Algebra.
CO2	Analyse the outcome of the circuit designed.
CO3	Create complex circuit with use of modular block interconnection.
CO4	Analyse I/O system and interconnection structures of computer.
CO5	Develop independent learning skills and be able to learn more about different computer architectures and hardware.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Digital Logic Circuits**: Digital Computers, Logic Gates, Boolean algebra, Complement of a Function, Map Simplification, Product-of-sum simplification, Don't care conditions, Combinational Circuits, Half Adder, Full Adder, Flip-Flops, Sequential Circuits.	**10**
Module – II **Digital Components**: Integrated Circuits, Decoders, NAND Gate Decoder, Encoders, Multiplexers, Registers, Register with parallel load, Shift Registers, Bidirectional Shift register with parallel load, Binary Counters, Binary counter with parallel load, Memory Unit, RAM, ROM, Types of ROMs. **Data Representation**: Data Types, Number System, Complements, Subtraction of Unsigned Numbers, Fixed-Point Representation, Floating-Point Representation, Other Binary Codes, Other Decimal Codes, Error Detection Codes	**10**
Module – III **Register Transfer and Micro-operations**: Register Transfer language, RegisterTransfer Bus and Memory Transfers, Three-State Bus Buffers, MemoryTransfer, Arithmetic Micro- operations, BinaryAdder, Binary Adder-Subtractor, Binaryincrementer, Arithmetic Circuit Logic, Micro-operations, Shift Micro-operations, HardwareImplementation, Arithmetic Logic Shift Unit.	**7**
Module – IV **Central Processing Unit**: Introduction, General Register Organization, Stack Organization, Register Stack, MemoryStack, Reverse Polish Notation, Evaluation of Arithmetic Expressions, InstructionFormats, AddressingModes, Data Transfer and Manipulation, ProgramControl, ProgramInterrupt, Types of Interrupts, Reduced Instruction Set Computer (RISC).	**8**
Module – V **Memory Organization:** Memory Hierarchy, Main Memory, RAM and ROM Chips, Memory Address Map, Memory Connection to CPU,	**5**

Auxiliary Memory, Magnetic Disks and Tape, Associative Memory, Hardware Organization, March Logic, Read/Write Operation, Cache Memory, Associative Mapping, Direct Mapping, Set-Associative Mapping, Virtual Memory, Address Space and Memory Space, Address Mapping Using Pages, Associative Memory Page Table, Page Replacement, Memory Management Hardware.	

Text Books:

1. Mano M., "Computer System Architecture", Prentice Hall of India, New Delhi, 1995.**(T1)**

Reference Books:

1. Morris Mano M & Ciletti M.D., "Digital Design", 4th Edition, PHI, 2008.**(R1)**
2. Hayes, J.P., "Computer Architecture and Organization", 3rdEdition, McGraw-Hill, London, 2000, **(R2)**
3. Ram. B., "Computer Fundamentals: Architecture and Organization", 3rdEdition, New Age International Publication, New Delhi, 2000.**(R3)**

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
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Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1				2	2	3	2
CO2	3	3	3	1	3	1	1	1				2	2	2	2
CO3	3	3	3	3	3	1	2	2		1	1	2	2	3	2
CO4	3	3	3	1	3		1	1		1	1	2	2	3	2
CO5	3	3	3	3	3	1	1	1	1	1	1	2	2	2	3

Correlation Levels 1, 2 or 3 as defined below:

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Mapping Between COs and Course Delivery (CD) methods

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CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course code: MT124

Course title: BUSINESS COMMUNICATION BASICS
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L: 2 T: 0 P: 0
Class schedule per week: 02
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

1.	Analyze and demonstrate writing and speaking processes through invention, organization, drafting, revision, editing, and presentation.
2.	Understand the importance of specifying audience and purpose and to select appropriate communication choices.
3.	Interpret and appropriately apply modes of expression, i.e., descriptive, expositive, Narrative, scientific, and self-expressive, in written, visual, and oral communication
4.	Participate effectively in groups with emphasis on listening, critical and reflective thinking, and responding.
5.	Develop the ability to research and write a documented paper and/or to give an oral presentation.

Course Outcomes
After the completion of this course, students will be able to:

CO1	Apply business communication strategies and principles to prepare effective communication for domestic and international business situations.
CO2	Utilize analytical and problem-solving skills appropriate to business communication.
CO3	Participate in team activities that lead to the development of collaborative work skills.
CO4	Select appropriate organizational formats and channels used in developing and presenting business messages
CO5	Communicate via electronic mail, Internet, and other technologies and deliver an effective oral business presentation.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module- I **Introduction to Business Communication:** Importance and Objectives of Business communication, Process of communication, Barriers to effective communication, Techniques of effective communication.	**(6L)**
Module-II **Managing Business Communication:** Formal and Informal communication, Non- verbal communication (Body language, Gestures, Postures, Facial expressions). The cross-cultural dimensions of business communication.	**(6L)**
Module-III Other aspects of communication: Vocabulary: Single word substitution, Idioms and phrases, Precis writing, Comprehension. Group Discussions, Extempore.	**(6L)**
Module-IV Introduction to managerial writing: Business letters: Inquiries, Circulars, Quotations, Orders, Acknowledgement, Claims & adjustments, Collection letters, Sales letters, Drafting of different resumes, Covering letters Applying for a job, Social correspondence, Invitation to speak.	**(6L)**
Module-V **Report writing and Technical Proposals:** Business reports, Types, Characteristics, Importance, Elements of structure, Process of writing, Order of writing, the final draft, checklists for reports.	**(6L)**

Books recommended:

TEXT BOOK

1. "Communication Skills", Sanjay Kumar &PushpLata, Oxford University Press. **(T1)**
2. "Business Correspondence and Report Writing", R.C.Sharma, Krishna Mohan, McGraw Hill. **(T2)**
3. "Communication for Business", Shirley Taylor, V. Chandra, Pearson. **(T3)**

REFERENCE BOOK

1. "Business Communication", HorySankar Mukherjee, Oxford University Press. **(R1)**
2. "Basic Business Communication", Lesikar I Flatley, McGraw Hill. **(R2)**
3. "Business Communication Today", Bovee, Thill and Chatterjee, Pearson. **(R3)**

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	1	2	1	2	2	1	2		3					3
CO2	3	1	2	1	1	2	1	1		3					3
CO3	3	3	1	2	1	1	1	1		3	1				3
CO4	2	2	1	2	1	1	2	1		3	1				3
CO5	2	1	1	3	2	2	1	1	1	3	1				3

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1,CD2,CD3
CD2	Tutorials/Assignments	CO2	CD1,CD2,CD3
CD3	Seminars	CO3	CD1,CD2,CD3
CD4	Mini projects/Projects	CO4	CD1,CD2,CD3,CO4 CD5
CD5	Laboratory experiments/teaching aids		
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course Code: CE101
Course Title: ENVIRONMENTAL SCIENCE
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:2 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	To develop basic knowledge of ecological principles and their applications in environment.
2.	To identify the structure and composition of the spheres of the earth, the only planet sustaining life.
3.	To analyse, how the environment is getting contaminated and probable control mechanisms for them.
4.	To generate awareness and become a sensitive citizen towards the changing environment.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Explain the structure and function of ecosystems and their importance in the holistic environment.
CO2	Identify the sources, causes, impacts and control of air pollution.
CO3	Distinguish the various types of water pollution happening in the environment and understand about their effects and potential control mechanisms.
CO4	Judge the importance of soil, causes of contamination and need of solid waste management.
CO5	Predict the sources of radiation hazards and pros and cons of noise pollution.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Ecosystem and Environment:** Concepts of Ecology and Environmental science, ecosystem: structure, function and services, Biogeochemical cycles, energy and nutrient flow, ecosystem management, fate of environmental pollutants, environmental status and reports on climate change.	**10**
Module – II **Air Pollution:** Structure and composition of unpolluted atmosphere, classification of air pollution sources, types of air pollutants, effects of air pollution, monitoring of air pollution, control methods and equipment for air pollution control, vehicular emissions and control, indoor air pollution, air pollution episodes and case studies.	**10**
Module – III **Water Pollution:** Water Resource; Water Pollution: types and Sources of Pollutants; effects of water pollution; Water quality monitoring, various water quality indices, water and waste water treatment: primary, secondary and tertiary treatment, advanced treatments (nitrate and phosphate removal); Sludge treatment and disposal.	**7**
Module – IV **Soil Pollution and Solid Waste Management:** Lithosphere – composition, soil properties, soil pollution, ecological & health effects, Municipal solid waste management – classification of solid wastes, MSW characteristics, collection, storage, transport and disposal methods, sanitary landfills, technologies for processing of MSW: incineration, composing, pyrolysis.	**8**
Module – V **Noise pollution & Radioactive pollution:** Noise pollution: introduction, sources: Point, line and area sources; outdoor and indoor noise propagation, Effects of noise on health, criteria noise standards and limit values, Noise measurement techniques and analysis, prevention of noise pollution; Radioactive pollution: introduction, sources, classification, health and safety aspects, Hazards associated with nuclear reactors and disposal of spent fuel rods-safe guards from exposure to radiations, international regulation, Management of radioactive wastes.	**5**

Text Books:

1. A, K. De., "Environmental Chemistry", New Age Publications India Ltd., 3rd Edition, 2008.**(T1)**
2. R. Rajagopalan,"Environmental Studies: From Crisis to Future", 3rd Edition, Oxford University Press, 2016.**(T2)**
3. Eugene P. Odum., "Fundamentals of Ecology", 3rd Edition, WB Sunders Company, Philadelphia, 1971.**(T3)**
4. C. N. Sawyer, P. L. McCarty and G. F. Parkin, "Chemistry for Environmental Engineering and Science", John Henry Press, 2002.**(T4)**
5. S.C. Santra,"Environmental Science", New Central Book Agency, 2011. **(T5)**

Reference Books:

1. D.W. Conell,"Basic Concepts of Environmental Chemistry", CRC Press.**(R1)**
2. Peavy, H.S, Rowe, D.R, Tchobanoglous, G.,"Environmental Engineering", Mc-Graw - Hill International. **(R2)**
3. G.M. Masters & Wendell Ela,"Introduction to Environmental Engineering and Science", PHI Publishers, 1991.**(R3)**

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Explain the structure and function of ecosystems and their importance in the holistic environmer
2. Identify the sources, causes, impacts and control of air pollutio
3. Distinguish the various types of water pollution happening in the environment and understand about their effects and potential control mechanisr

POs met through Gaps in the Syllabus

3, 4, 12, 13, 14

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	1	3	1	1	1				2			
CO2	3	3	3	1	3	1	1	1				2			
CO3	3	3	3	3	3	1	2	2		1	1	2			
CO4	3	3	3	1	3		1	1		1	1	2			
CO5	3	3	3	3	3	1	1	1	1	1	1	2			

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1, CD2
CD2	Tutorials/Assignments	CO2	CD1, CD2
CD3	Seminars	CO3	CD1, CD2
CD4	Mini projects/Projects	CO4	CD1, CD2
CD5	Laboratory experiments/teaching aids	CO5	CD1, CD2
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course Code: CA104
Course Title: MATHEMATICS-I (ELEMENTARY MATHEMATICS)
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	Get an understanding about set and relations.
2.	Demonstrate a depth of understanding of functions and binary operations.
3.	Gain an understanding of Abstract Algebra and Matrices.
4.	Get a brief idea about the principles of Differential Calculus and Differential Equations.
5.	Be able to solve differential equations and differential calculus problems.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Decide the behaviour of set and relations in the field of computer science.
CO2	Apply the concepts of functions and binary operations in various computer programs.
CO3	By using the properties of Algebra and Matrices to decide the behaviour different problems
CO4	Apply the principles of Differential Calculus and Differential Equations to solve a variety of scientific problems in engineering and sciences.
CO5	Enhance and develop the ability of using the language of mathematics in engineering.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Sets and Relations:** Sets and their representations, The empty set, Finite and Infinite set, Equal and equivalent set, Subset; powerset; Universalset; Venndiagrams; Operations on sets; Complement of a set; Cartesian product, Relation, Inverse Relation, Composition of relation, Equivalence of relations and Classes.	**10**
Module – II **Functions and Binary Operations:** Functions as a set, Representation of function, Types of Functions, Functions applicable in Computer Science: Integer function, Factorial function, Absolute, Characteristic, Floor, Ceiling, Remainder, Boolean, Exponential, Logarithmic, Hashing functions and Binary operation on a set.	**10**
Module – III **Abstract Algebra:** Group, Subgroup, Order of group, cyclic group and Simple theorems, Ring, Integral domain, Field and Simple theorem related to Integral domain and field.	**7**
Module – IV **Matrices Algebra:** Definition of matrix, Operations on matrices, Square matrix and its inverse, Inverse of a matrix by Row operation, Rank of matrix by Echelon form, Solution of a System of Linear Simultaneous equation by matrix method, Eigen value and Eigen vector, Caley Hamilton theorem (without proof), to find the inverse of a non-singular matrix using Caley-Hamilton theorem.	**8**
Module – V **Differential Calculus:** Successive differentiation, Leibnitz Theorem, Partial derivative, Partial derivative of Higher orders, Homogeneous function, Euler's Theorem on Homogeneous functions. **Differential equation:** Definition of Differential equation, Order and degree of a differential equation, Linear differential equation and Equation of Higher Order Linear differential equation with constant coefficients, Partial differential equations, Order and degree of partial differential equation,	**5**

Lagrange's Linear Equations, Linear Homogeneous partial differential equation.	

Text Books:

1. Vasishtha A.R., "Modern Algebra", Krishna Prakashan Media (P) Ltd, Meerut, 2006.**(T1)**
2. Vasishtha A.R, "Matrices", Krishna Prakashan Media (P) Ltd, Meerut, 2006. **(T2)**
3. DasH.K., "Advanced Engineering Mathematics", S. Chand, 2009.**(T3)**

Reference Books:

1. KolmanB., BusbyR. C., and RossS. C., "Discrete Mathematical Structures", 6th Edition, Prentice Hall of India, 2008.**(R1)**
2. ShethH., "Abstract Algebra", PHI, 2009.**(R2)**
3. GrewalB. S., "Higher Engineering Mathematics", Khanna Publishers, 2000.**(R3)**

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1				2	2	2	2
CO2	3	3	3	1	3	1	1	1				2	2	3	2
CO3	3	3	3	3	3	1	2	2		1	1	2	2	3	2
CO4	3	3	3	1	3		1	1		1	1	2	3	2	3
CO5	3	3	3	3	3	1	1	1	1	1	1	2	3	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD Code	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD7, CD 8
CD2	Tutorials/Assignments	CO2	CD1 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD3
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA102
Course Title: PROBLEM SOLVING AND PROGRAMMING IN C LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	To learn computer language.
2.	To Learn coding for problems.
3.	To learn the problem-solving process through computer.
4.	To know the limitations of system during program execution.
5.	To know the practical application of various programming techniques.

Course Outcomes

After the completion of this course, students will be able to:

CO1	To formulate simple algorithms for arithmetic and logical problems.
CO2	To translate the algorithms to programs.
CO3	To test and execute the programs and correct syntax and logical errors.
CO4	To apply programming to solve simple numerical method problems, differentiation of function and simple integration.
CO5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.

SYLLABUS

List of Programs as Assignments:

1. Write an interactive program that will read in a +ve integer value and determine the following
   i) If the integer is a prime number ii) If the integer is a Fibonacci number
2. WAP in C to compute sinx = $x - x^3/3! + x^5/3! - x^7/7!$ ….. Continue adding successive terms in the series until the value of the next term becomes smaller (in magnitude) than 10^{-5}. Test the program for x = 1, x = 2, and x = 3. In each case display the number of terms used to obtain the final answer.
3. WAP to generate every 3rd integer beginning with I = 2 and continue for all integers that are less than 150. Calculate the sum of those integers that are evenly divisible by 5.
4. WAP to find whether a given year is a leap year or not. Modify it to generate a list of leap years between two year limits given by user.
5. WAP to display the following pattern:

```
                    11
                11  10  11
            11  10  9   10  11
        11  10  9   8   9   10  11
```

6. Using Ternary / Conditional operator find the greatest among 3 numbers.
7. WAP to convert a decimal number into an equivalent number of the input base. Test your program for base 2,8,10 & 16.
8. WAP to read a number n, and print it out digit-by-digit, as a series of words. For e.g. 123 would be printed as "one two three".
9. WAP to check whether any input +ve integer is palindrome or not.
10. WAP to simulate a simple calculator (+ - / * %) that takes two operands and an operator as input and displays the result.
11. WAP to find the GCD of two input +ve integer numbers.
12. WAP to swap the values of two variables without using a third variable.
13. Read a line of mixed text, and then write it out with all lower case and uppercase letters reversed, all digits replaced by 0s and all other characters (non-letters and non-digits) replaced by '*'.

14. WAP to find the product of two matrices A and B. Display the source matrices and product matrix C in matrix format.

15. WAP to find whether a given matrix is a triangular matrix or not.

16. WAP to find the transpose of a matrix. Display the source and the transposed matrix in matrix format.

17. Implement Prob. No. – 14 to 16 using functions for reading, manipulating and displaying the corresponding matrices in matrix form.

18. WAP to sort a list of strings alphabetically using a 2-dim. Character array.

19. WAP to display the row sum and the column – sum of an input 2- dim. Matrix. Display the source matrix with row and column sum.

20. Write a recursive function to calculate S = 2 + 4 + 6 + 8 + …… +2N. Implement the function in a complete C program.

21. Write a function that accepts two arguments an array and its size n. It performs Bubble up sort on the array elements. Using indirection operator '*' implement this in a complete C program. Display the source and the sorted array.

22. Using pointer, write a function that receives a character string and a character as argument. Delete all occurrences of this character in the string. The function should return corrected string with no holes.

23. Write a function for reading character string using pointer. Calculate the length of the string (without using strlen ()). Finally print the string in reverse order, using pointer.

24. Implement prob. No. 14 using pointers representation of 2 – dim. array.

25. Implement prob. No. 15 using pointer representation of 2 dim. array.

26. Implement prob. No. 16 using pointer representation of 2 dim. array.

27. WAP to sort a list of strings into alphabetical order using array of pointers.

28. Create records of 60 students, where each record has fields-name, roll, gpa and fees. Write a function update () to reduce the fees of those students who have obtained gpa greater than 8.5 by 25% of the original fees. Write a complete program to exercise this function in the main program and display all the records before and after updation.

29. Define a structure that describes a hotel. It should have members that include the name, address, grade, average room charge and number of rooms. Write a function to perform the following operations:

a) To print out hotels of a given grade in order of charges.
b) To print out hotels with room charges less than a given value.

30. WAP to concatenate the contents of two files into a third file.

31. WAP to copy the content of one file into another file. Names of both the files are to be input as command line arguments

Text Books:

1. Jery R Hanly, “Problem solving and Program design in C”, Paerson Education, 7th Edition. **(T1)**
2. Byron Gottfried, “Schaum's Outline of Programming with C”, McGraw-Hill. **(T2)**
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill. **(T3)**
4. R.G.Dromey, How to Solve it by Computer, Pearson Education. **(T4)**

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, Prentice Hall India Learning Private Limited.**(R1)**

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: 180
Course Title: OFFICE AUTOMATION TOOLS
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	To learn automation tools
2.	To understand the basic of basic technology
3.	To learn the problem-solving process through computer.
4.	To know the limitations of automation
5.	To know the practical application of various automation tools

Course Outcomes

After the completion of this course, students will be able to:

CO1	To solve real time problems using automation tools
CO2	To translate the real time problem into automation problem
CO3	To analyse the basic application of automation tools.
CO4	To apply different tools for different automation problems
CO5	To decompose a real-time problem into a small automation problems.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **COMPUTER SCIENCE & OPERATING SYSTEMS (WINDOWS/LINUX)** 1. **Types of Computer:** Analog, Digital, and Hybrid type, Hardware, Software, System software, Application software, Stored Program Concept and Von Newman Architecture, Firm ware, Human ware, Stored Program Concept, Evolution of computers, Generation of computer. 2. **Data Processing:** Data collection, Classifications, Sorting and Merging, Processing, Summarizing Storing. 3. **Data Organisation:** Organization Data, Character, Field, Record, File, Database, Sequential Access, Random Access, Indexed Sequential Access. 4. **Data Communication:** Local Area Network, Wide Area Network, Satellite Communication, Internet. 5. **Operating System:** Introduction, Different Operating Systems, Loading and Quitting the Operating Systems Important DOS/Windows/Linux Commands.	**10**
Module – II **WINDOWS/Linux** 1. Windows Introduction, 2. Concepts different Operating System GUI/CUI. 3. Desktop Icons. (Windows / Desktop Linux) 4. My Computer, Recycle Bin, Internet Explorer, Network Neighbourhood, My Documents 5. Working with windows: How to create a Folder, Copying and cutting files, Renaming 6. Programs, Favourites, Documents, Settings, Find, Run, Shut down 7. APPLICATION ICONS 8. Introduction to Output Devices	**10**
Module – III **PERSONAL COMPUTER SOFTWARE TOOLS (MS WORD,** 1. Open Office Word Processing using MS WORD: An	**7**

introduction to MS-Word / ON INTRODUCTION TO WORD/Writer. 2. The Word work space, Starting and quitting word, Creating and Manipulating Various documents, Editing of proofing files, Merging documents and macros. 3. How to use Mouse and Menu, Working with dialog box 4. Primary Command in File Menu: The Open Commands, The File name commands, The New commands, The Save, Save As, and Save all commands, The Close command, The Page setup, The Print commands, The Exit commands 5. Edit Menu commands: The Cut, Copy, and Paste commands, The Undo and Repeat commands 6. Format commands: Font commands, Paragraph commands 7. Other Menu: The view menu, The Insert menu, The tool menu, The table menu, The Window menu	
Module – IV **EXCEL** 1. BUILDING A SIMPLE WORKSHEET 2. Entering Text, Entering Values, Entering Dates and Times, Moving Around, Selecting Ranges, Using Menu, Using 3. Tool Bar, Using Shortcut Menus, Changing Entries, Copying Entries, Moving Entries, Inserting and Deleting cells 4. FORMATTING BASICS 5. Changing Character Style, Changing Alignment, Changing Column Width 6. WORKING WITH MULTIPLE WORKSHEET 7. Copying entries between work books, Moving sheets between work books, Deleting sheets, Quitting Excel 8. OPENING EXISTING WORKBOOKS 9. Simple calculations, Doing Arithmetic, Totalling column of values, Naming cells and Ranges 10. FORMATTING TEXT 11. Displaying dollars and cents, Formatting decimal places, dates Format, Copying style and formats 12. FORMULAS THAT MAKE DECISIONS 13. Using the IF function, Using the nested IF function, Copying formulas 14. Checking Spelling, Printing Worksheets, Preview Worksheets, Setting up the pages, 15. Sorting data, Keeping Leading in View, Finding records, Adding and deleting Records, Filtering Records 16. Plotting charts, Sizing and moving charts, Updating charts, changing the chart type, Using chart auto format	**8**

17. Creating Macros, Recording Macros, Running Macros	
Module – V **POWER POINT** 1. Main Features of Power Point 2. MAKING THE PRESENTATION 3. Creating Template with the Auto Content Wizard. Creating a Presentation with a Template. Creating a presentation from Scratch 4. DIFFERENT VIEWS 5. Normal Slide, Outline, Slide Sorter, Slide Show, Notes, Slide Master 6. ANIMATION, ART AND SOUND 7. Controlling Transitions between slides. Animating Different Parts of a slide. In 8. Sounds in slides. 9. INCLUDING GRAPHS, CHARTS, TABLES AND COLUMNS 10. Organization Chart Slide, Creating a table Slide. Creating two column Slide, Module 1: Showing A Presentation, 11. Rehearsing/ Timing a Presentation, Designation some slides as "Hidden", Viewing Slides Anywhere in a Slide Show. 12. Techniques for Making a Show Livelier 13. OFFICE CONNECTIONS 14. Presenting with the help of other Office Programs Importing the text from a World Document. 15. Printing a Presentation	**5**

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Introduction to graphics and animation tool.
2. Multimedia Introduction.

POs met through Gaps in the Syllabus

1,2,3,4

Topics beyond syllabus/Advanced topics/Design

1. Animation.
2. App development.

POs met through Topics beyond syllabus/Advanced topics/Design

3, 5, 7, 8,

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		

CD9	Simulation		

Course Code: CA155
Course Title: DATA STRUCTURES
Pre-requisite(s): C/C++; Knowledge of programming languages
Co- requisite(s): DS Lab
Credits: 4 L:3 T:1 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To know details about the data structure.
B.	Applications, advantages and limitations of various data structures.
C.	Real life use of various data structures.
D.	Implementations of various data structures.
E.	Analyse and compare the different algorithms

Course Outcomes

After the completion of this course, students will be able to:

1.	Understand the properties of various data structures
2.	Identify the strength and weaknesses of different data structures
3.	Design and employ appropriate data structures for solving computing problems
4.	Analyze and compare the efficiency of algorithms
5.	Solve computing problems independently

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Algorithms and Analysis of Algorithms**: Definition, Structure and Properties of Algorithms, Development of an Algorithm, Data Structures and Algorithms, Data Structure – Definition and Classification, Efficiency of Algorithms, Asymptotic Notations, Polynomial Vs Exponential Algorithms, Average, Best and Worst case Complexities, Open source software development process.	**10**
Module – II **Arrays, Stacks and Queues**: Array Operations, Number of Elements in an Array, Representation of Arrays in Memory, Applications of Array, Stack-Introduction, Stack Operations, Applications of Stack, Queues-Introduction, Operations on Queues, Circular Queues, Other Types of Queues, Applications of Queues.	**10**
Module – III **Linked List, Linked Stacks and Linked Queues**: Singly Linked Lists, Circularly Linked Lists, Doubly Linked Lists, Applications of Linked Lists, Introduction to Linked Stack and Linked Queues, Operations on Linked Stacks and Linked Queues, Implementations of Linked Representations, Applications of Linked Stacks and Linked Queues.	**7**
Module – IV **Trees, Binary Trees, BST, AVL Trees and B Trees**: Trees: Definition and Basic Terminologies, Representation of Trees, Binary Trees: Basic Terminologies and Types, Representation of Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Applications. Introduction, BST: Definition and Operations, AVL Trees: AVL Definition and Operations, B Trees: Introduction, m-way search trees: Definition and Operations.	**8**
Module – V **Sorting and searching**: Introduction, Radix sort, Shell Sort, Quick Sort, Heap Sort. Searching: Introduction, Binary Search, Transpose Sequential Search, Interpolation Search.	**5**

Text Books:

1. BalujaG S, “Data Structure through C”, Ganpat Rai Publication, New Delhi, 2015.
2. PaiG A V, “Data Structures and Algorithms: Concepts, Techniques and Applications”, 2nd Edn, Tata McGraw-Hill, 2008.
3. Horowitz E., Sahni S., Susan A., “Fundamentals of Data Structures in C”, 2nd Edition, University Press, 2010.

Reference Books:

1. TremblayJ. P.**,** SorensonP. G, “An Introduction to Data Structures with Applications”, 2nd Edn, McGraw-Hill, Inc. New York, NY, USA.
2. Lipschutz Seymour, “Data Structures”, 6th Edn, 9th Reprint 2008, Tata McGraw-Hill.
3. Drozdek Adam, “Data Structures and Algorithms in C++”, Thomson Learning, New Delhi – 2007.
4. FellerJ., FitzgeraldB., “Understanding Open Source Software Development”, Pearson Education Ltd. New Delhi

Gaps in the Syllabus (to meet Industry/Profession requirements)

- Introduced programming skills for real time applications.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

- Topics related to real world application/ problem should be introduced.

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher’s Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA157
Course Title: DISCRETE STRUCTURES
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: II/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Use appropriate set, function, or relation models to analyse practical examples, interpret the associated operations and terminology in context.
B.	Determine number of logical possibilities and probability of events.
C.	Learn logic and proof techniques to expand mathematical maturity.
D.	Formulate problems precisely and explain their reasoning clearly.
E.	Solve the problems, apply formal proof techniques

Course Outcomes

After the completion of this course, students will be able to:

1.	To formulate problems precisely
2.	Solve the problems, apply formal proof techniques, and explain their reasoning clearly.
3.	Illustrate by example, basic terminology and model problems in computer engineering using graphs and trees
4.	Analyse problems precisely and explain their reasoning clearly.
5.	Solve the problems, apply formal proof techniques

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Sets and Propositions:** Sets, Operations of sets, Finite and Infinite sets, Principle of inclusion and exclusion, Propositions, Conditional Propositions, Logical Connectivity, Propositional calculus, Universal and Existential Quantifiers, Normal forms, Mathematical Induction.	**10**
Module – II **Relations and Functions:** Relations, Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence relations. Functions, Types of functions, Composition of functions, Invertible functions.Permutations and Combinations, Pigeonhole Principle, Recurrence Relation.	**10**
Module – III **Partially Ordered Sets:** Introduction, Elements of Partially Ordered Sets, Lattices.	**7**
Module – IV **Graph Theory and Trees:** Basic terminology, representation of a graph in computer memory, Relations and Digraphs, Paths in Relations and Digraphs, Shortest path in weighted graphs (Dijkstra's algorithm). Basic terminology and characterization of trees, Tree traversal, Spanning trees, Minimal Spanning trees(Introduction).	**8**
Module – V **Groups, Rings and Fields:** Groups, Semi Groups, Monoids, Subgroups, Isomorphism and Homomorphism and Normal Subgroups, Rings, Integral Domain, Rings Homomorphism, Polynomial Rings, Fields.	**5**

Text Books:

1. KolmanB., BusbyR. and RossS., "Discrete Mathematical Structures", 6th Edition, PearsonEducation, 2002, ISBN 81-7808-556-9.
2. DeoN., "Graph Theory with application to Engineering and Computer Science", Prentice Hall of India, 1990, 0 – 87692 – 145 – 4.
3. JohnsonbaughR., "Discrete Mathematics", 5th Edition, Pearson Education, 2001 ISBN 81 – 7808 – 279 – 9.

Reference Books:

1. BiggsN., "Discrete Mathematics", 3rd Edition, Oxford University Press, ISBN 0 –19 – 850717 – 8.
2. RosenKenneth H., "Discrete Mathematics and its Applications", 6th edition, McGraw-Hill, 2007, ISBN 978-0-07-288008-3.
3. LipschutzSemyour & Lipson Marc, "Discrete Mathematics", McGraw-Hill, 3rd Special Indian Edition, ISBN-13: 978-0-07-060174-1.
4. LiuC. L. and MohapatraD. P., "Elements of Discrete Mathematics", SiE Edition, Tata McGraw-Hill, 2008, ISBN 10:0-07-066913-9.
5. LipschutzS. and LipsonM., Schaum's Outline of Discrete Mathematics, Revised Third Edition, Tata McGraw Hill, 2010.
6. MottJ. L., KandelA. and BakerT. P., Discrete Mathematics for Computer Scientists and Mathematicians, 2nd Edition, Prentice Hall of India, 2001.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA160
Course Title: OPERATING SYSTEM CONCEPTS
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: II/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Present the main components of OS and their working
B.	Introduce the concepts of process and thread and their scheduling policies
C.	Handling synchronization of concurrent processes and deadlocks
D.	Analyze the different techniques for managing memory, I/O, disk and files
E.	Design the components of operating system

Course Outcomes

After the completion of this course, students will be able to:

1.	Understand the general architecture of computer system.
2.	Understand, contrast and compare differing structures for operating systems
3.	Gain proficiency needed to analyse theory and implementation of: processes, scheduling, I/O and files systems.
4.	Be familiar with various types of operating systems including Unix /Linux
5.	Get in-depth knowledge of memory management for operating systems

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Introduction & System Structures: What Operating Systems do, Computer System Organisation, Computer System Architecture: Single Processor Systems, Multiprocessor Systems, Clustered Systems, Operating System Structure, Operating System Operations, Distributed Systems, Special Purpose Systems, Computing Environments, Open-Source Operating Systems, Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation: Design Goals, Mechanisms and Policies, Implementation, Operating System Structure: Simple Structure, Layered Approach, System Boot.	**10**
Module – II Process Management: Process Concept, Operations on Processes, Process Scheduling- Basic Concepts, Scheduling Queues, Schedulers, Pre-emptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling Algorithms.	**10**
Module – III Deadlock Handling: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.	**7**
Module – IV Memory Management: Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation. File Management: File Concept, Access Methods, Directory & Disk Structure, File System Mounting, File Sharing, Protection, File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management.	**8**
Module – V Secondary Memory Management: Overview of Mass Storage Structures, Disk Structure, Disk Scheduling, Disk Management. Case Study- The Linux System: Linux History, Design Principles, Kernel Modules, Process Management, Scheduling (except Symmetric Multiprocessing), Memory Management (except Virtual Memory), File Systems, Input & Output.	**5**

Text Books:

1. SilberschatzA., GalvinP.B. & GagneG., “Operating System Concepts”, 8th Edition, Wiley India, 2012.

Reference Books:

1. DeitelH.M., “Operating Systems”, 3rd Edition, Prentice-Hall of India, 2006.
2. TanenbaumA.S., “Modern Operating Systems”, 2nd Edition, Prentice-Hall of India, 2010.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Page Replacement Algorithms
2. Case Study of any OS.
3. Applications of advance memory management.

POs met through Gaps in the Syllabus

3, 4, 12, 13

Topics beyond syllabus/Advanced topics/Design

1. Distributed Operating Systems
2. Design of access matrix.
3. Design of kernel model of Linux OS.
4. Application design of Virtual Memory.

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher’s Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA158
Course Title: NUMERICAL AND STATISTICAL METHODS
Pre-requisite(s): Programming knowledge and High-level Mathematics
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: II/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Able to map a problem in the computer domain so that with the help of computer it can be Solved.
B.	To develop skill to represent and solve a problem in Computer
C.	Able to understand the basic of computing methodologies that done with computers.
D.	To develop understanding of basic of computation methodologies
E.	Understating the functionality of Abstract machines with their limitations

Course Outcomes

After the completion of this course, students will be able to:

1.	Identify problems in the computer domain.
2.	Explain the basic of computing methodologies that done with computers
3.	Evaluate basic computation methodologies
4.	Analyse functionality of Abstract machines with their limitations
5.	Apply computing methodologies that are done with computers.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Errors in Numerical Methods:** Concept of Exact and Approximate Numbers, Significant Figures, Rounding off rules, Absolute, Relative and Percentage Errors, General Error Formula. **Solution of Algebraic and Transcendental Equations:** Basic Concepts, Geometrical Interpretation (if any), Condition for Convergence, Rate of Convergence, Bisection Method, Method of False Position or Regula-Falsi Method, Method of Iteration, Newton Raphson Method.	**10**
Module – II **Interpolation :** Finite Differences, Forward Difference Operator, Backward Difference Operator, Central Difference Operator, Shift Operator – Properties of the Operators, Relation among the Operators, Differences of a Polynomial, Newton's Forward and Backward Difference Interpolation Formulae, Gauss' Central Difference Interpolation Formulae, Lagrange's Interpolation, Divided Differences and their properties, Newton's general interpolation formula with divided difference, Inverse interpolation using Lagrange's interpolation formula.	**10**
Module – III **System of Linear Algebraic Equations:** Matrix Inversion Method, Gauss Elimination Method, Gauss Jordan Method, LU Decomposition Method, Gauss-Jacobi Method, Gauss –Seidel Method. **Numerical Differentiation and Integration:** Numerical Differentiation, Numerical Integration, Derivation of General Quadrature Formula., Trapizoidal Rule, Simpson's 1/3- Rule, Simpson's 3/8- Rule. **Numerical Solution of Ordinary Differential Equations:** Solution by Taylor's Series, Euler's Method, Modified Euler's Method, Runge-Kutta Methods (2^{nd} order)	**7**
Module – IV **Concepts of Probability:** Experiment and Sample Space, Events and Operations with Events, Probability of an Event, Basic Probability Rules, Applications of Probability Rules, Conditional Probability. **Random Variables:** How Random Variable Arise, Probability Distribution of a Random Variable, Mean or Expected Value of a Random Variable, Probability Histogram Value of a Random Variable, Variance and Standard Deviation of a	**8**

Random Variable. **Binomial Experiments:** Structure of a Binomial Experiment, Binomial Probability Distribution, Use of Binomial Probability Table. **Normal Curve and Normal Distribution:** Motivation behind a Normal Curve, Properties of a Normal Curve, Normal Probability Distribution, Areas Under a Normal Curve.	
Module – V **Estimation of Population Parameters:** Parameter and Statistic, Point and Interval Estimation, Interval Estimation of Three Common Parameters. **Bivariate Quantitative Data- Correlation and Regression:** Concepts of a Bivariate Data Set, Correlation Coefficient, Inferences on a Population Correlation Coefficient, The Regression line, Inferences on the Population Regression Line.	**5**

Text Books:

1. SastryS.S., "Introductory Methods of Numerical Analysis", PHI, Private Ltd., New Delhi.
2. PalN. & SarkarS., "Statistics: Concepts and Applications", PHI, New Delhi, 2005.

Reference Books:

1. HoggR.V. et.al, "Probability and Statistical Inpane", 7th Edn, Pearson Education, New Delhi, 2006.
2. BurdenR.L. & FairesJ.D., "Numerical Analysis", Thomson Learning-Brooks/Cole, IndianReprint, 2005.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
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CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

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Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA156
Course Title: DATA STRUCTURES LAB
Pre-requisite(s): C/C++; Knowledge of programming languages
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: II/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To assess how the choice of data structures and algorithm design methods impact the performance of programs.
B.	To choose the appropriate data structure and algorithm design method for a specified application.
C.	To solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, binary search trees, and graphs and writing programs for these solutions.
D.	Analyse and compare the different algorithms

Course Outcomes

After the completion of this course, students will be able to:

1.	Be able to design and analyze the time and space efficiency of the data structure
2.	Analyze run-time execution of previous learned sorting methods, including selection, merge sort, heap sort and Quick sort
3.	Have practical knowledge on the applications of data structures
4.	Be capable to identity the appropriate data structure for given problem

SYLLABUS

1. Program to Find the Number of Elements in an Array
2. Develop and Implement a menu driven program in C for the following Array operations
    a. Creating Array of N Integer elements.
    b. Display of Array elements with suitable headings.
    c. Inserting an element (ELEM) at a given valid position (POS).
    d. Deleting an element at a given valid position (POS).
    e. Exit
3. Programs for Stack, Queues and Circular Queues using Arrays
4. Program to convert an Infix Expression into Postfix and Postfix Evaluation
5. Program to implement stack using arrays
6. Program to implement stack using linked list
7. Program to implement multiple stack in a single array
8. Program to convert infix notation to postfix notation using stacks
9. Program to implement queue using arrays
10. Program to implement queue using pointers
11. Program to reverse elements in a queue
12. Program to implement circular queue using arrays
13. Program to create add remove & display element from single linked list
14. Program to create add remove & display element from double linked list
15. Program to count number of nodes in linear linked list
16. Program to create add remove & display element from circular linked list
17. Programs to implement stack & queues using linked representation
18. Program to concatenate two linear linked lists
19. Program to accept a singly linked list of integers & sort the list in ascending order.
20. Program to reverse linked list
21. Program to represent polynomial using linked list
22. Program to add two polynomials using linked list
23. Program for the creation of binary tree, provide insertion & deletion in c
24. Program for pre-order, post-order & in-order traversals of a binary tree using non recursive.
25. Program to count no, of leaves of binary tree
26. Program for implementation of B-tree (insertion & deletion)
27. Program for implementation of multi-way tree in c
28. Program for implementation of AVL tree
29. Program to implement bubble sort program using arrays
30. Program to implement merge sort using arrays
31. Program to implement selection sort program using arrays
32. Program to implement insertion sort program using arrays
33. Program to implement topological sort using arrays
34. Program to implement heap sort using arrays
35. Program to implement heap sort using pointers
36. Program to implement bubble sort program using pointers
37. Program to implement linear search using pointers
38. Program to implement binary search using pointers
39. Program to implement linear search using arrays

40. Program to implement binary search using arrays

Text Books:

1. Baluja G S, “Data Structure through C”, Ganpat Rai Publication, New Delhi, 2015.
2. Pai G A V, “Data Structures and Algorithms: Concepts, Techniques and Applications”, 2nd Edn, Tata McGraw-Hill, 2008.
3. Horowitz E., Sahni S., Susan A., “Fundamentals of Data Structures in C”, 2nd Edition, University Press, 2010.

Reference Books:

1. Tremblay J. P.**,** Sorenson P. G, “An Introduction to Data Structures with Applications”, 2nd Edn, McGraw-Hill, Inc. New York, NY, USA.
2. Lipschutz Seymour, “Data Structures”, 6th Edn, 9th Reprint 2008, Tata McGraw-Hill.
3. Drozdek Adam, “Data Structures and Algorithms in C++”, Thomson Learning, New Delhi – 2007.
4. Feller J., Fitzgerald B., “Understanding Open Source Software Development”, Pearson Education Ltd. New Delhi

Gaps in the Syllabus (to meet Industry/Profession requirements)

Introduction of advanced programming concept keeping in view industry requirement.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

Practical orientation programming should be given emphasis

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA161
Course Title: OPERATING SYSTEM LAB
Pre-requisite(s): C/C++; Knowledge of programming languages
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 03
Class: BCA
Semester / Level: II/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Present the main components of OS and their working
B.	Introduce the concepts of process and thread and their scheduling policies
C.	Handling synchronization of concurrent processes and deadlocks
D.	Analyze the different techniques for managing memory, I/O, disk and files
E.	Design the components of operating system

Course Outcomes

After the completion of this course, students will be able to:

1.	Understand the general architecture of computer system.
2.	Understand, contrast and compare differing structures for operating systems
3.	Gain proficiency needed to analyse theory and implementation of: processes, scheduling, I/O and files systems.
4.	Be familiar with various types of operating systems including Unix /Linux
5.	Get in-depth knowledge of memory management for operating systems

SYLLABUS

1. Implement in C the following UNIX commands using System calls : cat and mv
2. WAP in C to Determine the size of a file using the lseek command.
3. WAP to calculate the number of blocks assigned for the file.
4. Write a C program that deletes a directory with all its subfolders. The name of the directory should be read from the command line.

5. Write a program that deletes every 5th byte from a file, but without using a temporary file or allocating a buffer in the memory.
6. WAP in C to implement FCFS CPU scheduling Algorithm.
7. WAP in C to implement SJF CPU scheduling Algorithm.
8. WAP in C to implement Priority CPU scheduling Algorithm.
9. WAP in C to implement Round Robin (RR) CPU scheduling Algorithm.
10. WAP in c to read from the buffer & produce desired output.
11. WAP ii C to create Userid & Password.
12. WAP in c to implement and find how many Users currently login in NetWork.
13. WAP in c to create your won system call just like a copy.
14. WAP in c to create your won system call just like a delete.
15. WAP in c to find the Disk Space.
16. WAP In C to find The number of pages in the process.
17. WAP In C to find The number of frames allocated to the process.
18. WAP in c to find the no. of blocks occupied by a file.
19. WAP in c to create your won system call just like a delete.
20. WAP in c to create your won system call just like a ls.
21. WAP in c to find a PID no. of any Process.

Gaps in the Syllabus (to meet Industry/Profession requirements)

4. Shell Programming under Linux OS
5. Case Study of any OS.
6. Applications are of Linux OS.

POs met through Gaps in the Syllabus

3, 4, 12, 13

Topics beyond syllabus/Advanced topics/Design

5. Distributed Operating Systems
6. Design of access matrix.
7. Design of kernel model of Linux OS.
8. Application design of Virtual Memory.

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		

CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA159
Course Title: NUMERICAL AND STATISTICAL METHODS LAB
Pre-requisite(s): C/C++; Knowledge of programming languages
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 03
Class: BCA
Semester / Level: II/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Present the main components of OS and their working
B.	Introduce the concepts of process and thread and their scheduling policies
C.	Handling synchronization of concurrent processes and deadlocks
D.	Analyze the different techniques for managing memory, I/O, disk and files
E.	Design the components of operating system

Course Outcomes

After the completion of this course, students will be able to:

1.	Understand the general architecture of computer system.
2.	Understand, contrast and compare differing structures for operating systems
3.	Gain proficiency needed to analyse theory and implementation of: processes, scheduling, I/O and files systems.
4.	Be familiar with various types of operating systems including Unix /Linux
5.	Get in-depth knowledge of memory management for operating systems

SYLLABUS

1. Implement in C the following UNIX commands using System calls : cat and mv
2. WAP in C to Determine the size of a file using the lseek command.
3. WAP to calculate the number of blocks assigned for the file.
4. Write a C program that deletes a directory with all its subfolders. The name of the directory should be read from the command line.

5. Write a program that deletes every 5th byte from a file, but without using a temporary file or allocating a buffer in the memory.
6. WAP in C to implement FCFS CPU scheduling Algorithm.
7. WAP in C to implement SJF CPU scheduling Algorithm.
8. WAP in C to implement Priority CPU scheduling Algorithm.
9. WAP in C to implement Round Robin (RR) CPU scheduling Algorithm.
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11. WAP ii C to create Userid & Password.
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13. WAP in c to create your won system call just like a copy.
14. WAP in c to create your won system call just like a delete.
15. WAP in c to find the Disk Space.
16. WAP In C to find The number of pages in the process.
17. WAP In C to find The number of frames allocated to the process.
18. WAP in c to find the no. of blocks occupied by a file.
19. WAP in c to create your won system call just like a delete.
20. WAP in c to create your won system call just like a ls.
21. WAP in c to find a PID no. of any Process.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA201
Course Title: OBJECT ORIENTED PROGRAMMING USING JAVA
Pre-requisite(s): Introduction to Structured Programming
Co- requisite(s): JAVA Lab
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: III/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Learn about Object oriented programming concepts
B.	Learn how to use the JDK
C.	Improve their programming skills in core Java
D.	Use the Java packages, applets for software development
E.	Use the knowledge of object-oriented programming through Java

Course Outcomes

After the completion of this course, students will be able to:

1.	Elaborate the use of JDK of various versions for programming
2.	Identify the latest know-how related to the new developments in the field of Java
3.	Apply the knowledge gained for their project work as well as to develop some GUI applications.
4.	Design solutions in JAVA
5.	Apply features of Advanced Java through programming

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Procedure-Oriented Programming, Object-Oriented programming, Benefits of OOP, Applications of OOP, Basics, Evolution of Java, Structure of JAVA Program, Simple Java Program, Tokens, Comments, Identifiers, Operators, Literals, Control Structures. Java Environment Setup, Compiling a Java Program, Java Virtual Machine, Philosophy of Java and Benefits.	**10**
Module – II **Data types and program statements**: Primitive and reference data types, variables and constants, enumerated constants, labelled statement, expression and null statements, compound statement, control statement – decision and loops, jump statement, declaration statement, try-throw-catch-finally statement, declaring and creating arrays, accessing array elements, assigning values to array elements, multidimensional arrays.	**10**
Module – III **Functions, Data Abstraction and classes**: Declaration, definition and call, main method arguments, reference variables, method overloading, parameter passing by value for primitive types, object references and arrays, scope of variables, return from methods. Class and object, class members and initialization, access rights of members – public, private and protected access modifiers, constructor and copy constructor, mutability, finalization, dynamic memory management, garbage collection, this keyword, static members, scope of variables, interface – declaration, implementation and extending, package and package visibility.	**7**
Module – IV **Inheritance and Collection classes**: multi-level and single inheritance, multiple inheritance of interfaces, Object class, access rights in subclasses and packages, constructor calling sequence, super keyword, dynamic binding of methods, abstract class, overriding, shadowing and hiding, finalize, association, aggregation and composition. String, StringBuffer, Date, Calendar, Math, Object, Class, Exception class	**8**
Module – V	**5**

Input/Output and JAVA Applets: Stream clases – InputStream, OutputStream, Buffered Stream, file classes and handling, pushback streams, reader and writer classes, file reader and writer, serialization. Applet code example, HTML tags for applet, applet life cycle, color, font andbasic GUI handling, basic graphics, and animation.	

Text Books:

1. Balagurusamy E., "Programming in Java", 2nd Edition, Tata McGraw Hill Publication, New Delhi.

Reference Books:

1. Naghton Patrick & Schildt H., "The Complete Reference Java 2", Tata McGraw Hill Publication, New Delhi.
2. Dietel Harvey M & Dietel Paul J., "Java How to program", 7th edition, Pearson Education, New Delhi.

Gaps in the Syllabus (to meet Industry/Profession requirements)

7. Multithreading process in Java.
8. Detailed applet programming.
9. Handling available Java applications as case studies for better understanding.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

9. Concepts of multithreading in Java
10. Detailed knowledge on GUI designs in Java
11. Database connectivity with front end

POs met through Topics beyond syllabus/Advanced topics/Design

3, 4, 5, 6

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA203
Course Title: DATABASE MANAGEMENT SYSTEMS
Pre-requisite(s): Introduction to Structured Programming
Co- requisite(s): JAVA Lab
Credits: 4 L:3 T:1 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To understand the structure of databases
B.	To learn Query processing and decomposition.
C.	To understand how to create a database
D.	To learn transaction processing in databases
E.	To understand how concurrency control is performed in a database.
F.	To understand fault tolerance and reliability of database.

Course Outcomes

After the completion of this course, students will be able to:

1.	Design a database for a given set of requirements.
2.	Use SQL.
3.	Apply normalization techniques on given database.
4.	Have knowledge of 'indexing and hashing' mechanisms in a database management system.
5.	Have idea of the backend activities involved in extracting data from a database.Have knowledge of transaction and concurrency control mechanisms in a database management system.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Introduction:** Purpose of Database Systems, View of Data, Data Models, Database Languages, Relational Database, Database Architecture, Database Users and Administrators, Transaction Management.	**10**
Module – II **Relational Data Models and Languages:** Basic Concepts, Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R Features, Reduction of an E-R Diagram to Tables, The Relational Algebra, The Tuple Relational Calculus and The Domain Relational Calculus.	**10**
Module – III **Relational-Database Design:** Pitfalls in Relational-Database Design, Functional Dependencies, Decomposition, Desirable Properties of Decomposition, First Normal Form, Second Normal Form, Third normal Form, Boyce-Codd Normal Form, Fourth Normal Form and More Normal Forms.	**7**
Module – IV **Query Processing and Optimization:** Overview, Measures of Query Cost, Selection Operation, Join Operation, Other Operations, Evaluation of Expressions, Transformation of Relational Expressions, Estimating Statistics of Expression Results, and Choice of Evaluation Plans.	**8**
Module – V **Transactions and Concurrency Control:** Transaction Concept, Transaction State, Desirable Properties of Transactions, Concurrent Executions, Serializability, Recoverability, Lock-Based Protocols, Timestamp-Based Protocols and Deadlock Handling.	**5**

Text Books:

1. Silberschatz, Korth, & Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill, 2011.

Reference Books:

1. Elmasri, & Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2008.
2. Date C.J., "An Introduction to Database System", Pearson Education, New Delhi, 2005.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
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CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
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1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA202
Course Title: OBJECT ORIENTED PROGRAMMING USING JAVA LAB
Pre-requisite(s): INTRODUCTION TO STRUCTURED PROGRAMMING
Co- requisite(s): Java Lab
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Learn about Object oriented programming concepts
B.	Learn how to use the JDK
C.	Improve their programming skills in core Java
D.	Use the Java packages, applets for software development
E.	Use the knowledge of object-oriented programming through Java

Course Outcomes

After the completion of this course, students will be able to:

1.	Elaborate the use of JDK of various versions for programming
2.	Identify the latest know-how related to the new developments in the field of Java
3.	Apply the knowledge gained for their project work as well as to develop some GUI applications.
4.	Design solutions in JAVA
5.	Apply features of Advanced Java through programming

SYLLABUS

1. WAJP to show the characteristic of a number. {E.g. 24 it has two coefficients 2 in tens position and 4 in units position. It is composed of 2 and 3. It is a positive number. Also show whether it is odd or even.
2. WAJP to take input through command line argument and do the following:
    a) Check whether the number is prime.
    b) Generate the reverse a number.
3. Write a menu driven program using switch in Java to perform following:
    a) For input of 1, check whether the number is prime
    b) For input of 3, find the factors of the number
    c) For input of 5, check the number is odd or even.
4. Write a program in Java to generate hexadecimal equivalent of a number without using array.
5. WAJP to take two number inputs through command line argument and do the following:
    a) Check whether two numbers are prime to each other or not.
    b) Find LCM of two numbers.
6. WAJP to create a class and exhibit the role of static functions (other than main) by declaring, defining and calling them.
7. WAJP to compute and display the count of occurrence of 4 in a number. E.g. 4564 will compute 2.
8. WAJP to take an angle value in degrees and then compute the equivalent radians and then prove $\sin^2 \square \square \cos^2 \square \square 1$. Note $180^o \square \square ^c$.
9. WAJP to sort a list of numbers in ascending order.
10. WAJP to generate Pascal's Triangle using a square matrix.
11. Write a program in Java to take input of two 3×3 matrices through command line argument and then:
    a) Add them up and display the result
    b) Subtract them and display the result
    c) Multiply them and display product
12. WAJP to count the number of words, characters in a sentence.
13. Write a program in Java to take input of a sentence through command line argument and then count the number of words and vowels.
14. WAJP to handle the Exception using try and multiple catch block; the exceptions that you will handle are, number format error, array bound error and divide by zero.
15. WAJP to create a class called **Room** with two data member length and width and then implement constructor overloading in it.
16. Write a program in Java to explain the role of the following:
    a) Non-parameterized constructor
    b) Parameterized constructor
    c) Copy constructor

Take input and display the output.

16. WAJP to create a class called **Fraction** with data member numerator and denominator; take input (through command line argument) of two fractions and then add, subtract, multiply and divide, finally display the result in reduced term.
17. Write a program in Java to create a class for **Employee** having 2 data member code and name. Then create 3 classes **Officer**, **AdminStaff** and **MStaff**. The **Officer** class has data members designation and pay-scale; the **AdminStaff** has data members grade and pay-band; the **MStaff** has data member department and two sub-classes **Regular** and **Casual**. The **Regular** staff has data members level and consolidated-pay and **Casual** has data member daily-wage. Take all inputs through constructors and write appropriate methods for displaying one data for each type of class.
18. WAJP to design a class called **Account** using the inheritance and static that show all function of bank (withdrawal, deposit) and generate account number dynamically.
19. WAJP to design an application *Password.java* that produces and prints a random password depending upon name of an individual. If the input is Abdul Kalam then the password would be *33421LAM*. Note: take the first name A=1, B=2, D=4, U=21 where 2+1=3, and L=12, where 1+2=3; so the number comes to be *12433*, so u can find out.
20. WAJP to draw a format like

```
    *
   ***
  *****
 *******
  *****
   ***
    *
```

21. WAJP to take a string count all vowels and then delete the same from the string.
22. Write a **Patient** class which inherits from the **Person** class. Patient can again be of two types, indoor and outdoor. The Patient class requires the following:
    a) a variable to store the patient ID for the patient
    b) a variable to store the department of hospital
    c) a variable to store the ward of hospital
    d) a variable to store the patient 's date of joining the hospital
    e) a variable to store the patient 's address
    f) a variable to store the medical fees that the patient pays
    g) constructor methods, which initialize the variables
    h) a method to calculate the medical fees (for both indoor and outdoor patient)
23. WAJP to take a string as password and check whether it contains at least two

numbers, 3 alphabets and no space in it. If any contrary throw message.

24. Write a program in Java to create a class called Rational having two data members for numerator and denominator. Take two inputs of rational numbers and perform multiplication and division. Display the result in reduced form.

25. Write a program in Java to print a format like,

```
* * * * * * *
 * * * * *
  * * *
   *
```

26. Write a class called **Shape** which contains a user-defined interface for **Computation**, which contains methods for calculation of area, perimeter and volume. Write four classes for **circle, rectangle, sphere** and **rectangular parallelepiped**, and all these classes inherit from Shape. Now take input for the following:
    a) radius of circle and compute its area and perimeter
    b) Length and breadth of rectangle and compute its area and perimeter
    c) Length, breadth and height for **rectangular parallelepiped** and compute its area and volume
    d) Radius of sphere and compute its area and volume

** Area of circle= πr^2, perimeter of circle= $2\pi r$, area of sphere= $4\pi r^2$, volume of sphere= $\frac{4}{3}\pi r^3$, volume of rectangular parallelepiped = $l \times b \times h$ area of rectangular parallelepiped= $2(l \times b \times b \times h \times h \times l)$

27. Write a class called Employee, which requires the following:
    a) a variable to store the employee ID
        a. employee ID should be of format EMP**M**1234, EMP**S**1234, EMP**A**1234, EMP**C**1234, where M=manager, S=supervisor, A=analyst, C=clerk; number can be any no. but first three characters should be EMP
    b) a variable to store the employee name
    c) a variable to store department
    d) a variable to store city
    e) a variable to store basic salary
    f) a method to calculate the salary of employee
        a. if the city is metro then the HRA would be 30% else 20%
        b. if the employee ID contain M then DA would be 120%, if S then DA would be 110%, if A then DA would be 100%, and if C then DA would be 90%
    g) constructor methods, which initialize the variables

28. WAJP to create 4 threads and show exhibit their execution after the call of the "start ( )" method.

Write a program in Java to create 3 threads and exhibit their behaviour by changing their priorities in the "main" thread. Display the possible output.

Gaps in the Syllabus (to meet Industry/Profession requirements)

10. Multithreading process in Java.
11. Detailed applet programming.
12. Handling available Java applications as case studies for better understanding.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

12.Concepts of multithreading in Java
13.Detailed knowledge on GUI designs in Java
14.Database connectivity with front end

POs met through Topics beyond syllabus/Advanced topics/Design

3, 4, 5, 6

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA204
Course Title: DATABASE MANAGEMENT SYSTEMS LAB
Pre-requisite(s): INTRODUCTION TO STRUCTURED PROGRAMMING
Co- requisite(s): Java Lab
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To understand the structure of databases
B.	To learn Query processing and decomposition.
C.	To understand how to create a database
D.	To learn transaction processing in databases
E.	To understand how concurrency control is performed in a database.
F.	To understand fault tolerance and reliability of database.

Course Outcomes

After the completion of this course, students will be able to:

1.	Design a database for a given set of requirements.
2.	Use SQL.
3.	Apply normalization techniques on given database.
4.	Have knowledge of 'indexing and hashing' mechanisms in a database management system.
5.	Have idea of the backend activities involved in extracting data from a database.Have knowledge of transaction and concurrency control mechanisms in a database management system.

SYLLABUS

List of Programs as Assignments:

Consider the following tables:

emp(empno,ename,job,mgr,hiredate,sal,comm,deptn

o,gr), dept(deptno,dname,loc)

Write the following queries:

1. List all information about all department from emp table.
2. List all employee names along with their salaries from emp table.
3. List all department numbers, employee numbers and their managers numbers in descending order of deptno from emp table.
4. List department names and locations from the dept table.
5. List the employees belonging to the department 20.
6. List the name and salary of the employees whose salary is more than 1000.
7. List the names of the clerks working in the department 20.
8. List the names of analysts and salesmen.
9. List the details of the employees who have joined before the end of September 81.
10. List the names of employees who are not managers.
11. List the names of employees whose employee number are 7369, 7521, 7839, 7934, 7788.
12. List the employee details not belonging to the department 10, 30, and 40.
13. List the employee name and salary, whose salary is between 1000 and 2000.
14. List the employee names, who are not eligible for commission.(salary having >15,000 eligible for commission)
15. List the employees who are eligible for commission.
16. List the details of employees, whose salary is greater than 2000 and commission is NULL.
17. List the employees whose names start with an "S" (not"s").
18. List the name, salary and PF amount of all the employees(PF is calculated as 10% of salary).
19. List the empno, ename, sal in ascending order of salary.
20. List the employee name, salary, job and Department no descending order of Department No and salary.
21. List the employee details in ascending order of salary.
22. List the employee details in descending order of salary
23. Display name, and sal and commission of all employees whose monthly salary is greater than their commission.
24. Select SMITH HAS WORKED IN THE POSITION OF CLERK IN DEPT 20.Display result in this format.
25. Generate a statement which prompts the user at runtime. The intention is to display employees hired between 2 given dates.
26. Define a variable representing an expression used to calculate total annual

remuneration. Use the variable in a statement which finds all employees who earn $30000 a year or more.

27. List all the employees name and salaries increased by 15% and expressed as a whole number of dollars.
28. Produce the following

EMPLOYEE AND JOB

SMITH CLERK
ALLEN SALESMAN

29. Produce the following output:

SMITH (Clerk)
ALLEN (Salesman)

30. Do a case sensitive search for a list of employees with a job that the user enters.
31. It has been discovered that the sales people in dept. 30 are not all male. Please produce the Followingoutput.

ENAME	DEPTNO	JOB
ALLEN	30	Sales Person

32. Display each employees name and hiredate of dept 20.

33. Display each employees name, hiredate and salary review date. Assume salary review date is one year from hiredate. Output should be in ascending review date.

34. Print list of employees displaying just salary, if more than 1500. If exactly 1500 display " On Target". If less than 1500 display " Below 1500".

35. Write a query which returns DAY of the week (i.e. MONDAY) for any date entered in the format DD/MM/YY.
36. Write a query to calculate length of service of each employee.
37. Find the minimum salary of all employees.
38. Find the maximum, minimum, and average salaries of all employees.
39. List the maximum and minimum salary of each job type.
40. Find how many managers are in each dept.
41. Find the average salary and average total remuneration of each job type. Remembers sales man earn commission.
42. Find out the difference between highest and lowest salary.
43. Find all department s which have more than three employees.
44. Check whether all employee nos are unique. (No Duplicate)
45. List lowest paid employee working for each Manager. Exclude any groups where the minimum salary is less than 1000. Sort the output by salary.
46. Produce a list showing employees 'salary grade'.(> 10000 A, >10000 &<20000 B, >20000 C)
47. Show only employee on Grade C.
48. Show all employee in Dallas.
49. List the employees name, job, salary, grade and department for everyone in the

company except clerks. Sort on salary, displaying the highest first.

50. List the following details of employees who earn $36000 a year or who are clerks.

Ename Job Annual Sal Dept no Dname Grade

51. Display all employees who earn less than their managers.
52. Display all employees by name and eno along with their managers name and number.
53. Modify above spoliation to display KING who has no MANAGER.
54. Find the job that was files in the first half of 1983 and the name job that was filled in the same period in 1984.
55. Find all employees who have joined before their manager.

EMPLOYEE HIREDATE MANAGER HIREDATE

56. Find the employees who earn the highest salary in each job, type, sort in descending order of salary.
57. Find the employees who earn the minimum salary for their job, Display the result in descending order of salary
.
58. Find the most recently hired employees in the department. Order by hiredate.
59. Show the details of any employee who earns a salary greater than the average for their department. Sort in department number order.
60. List all department where there are no employees.

TEXT BOOK

1.SQL, PL/SQL the programming Language of Oracle, Ivan Bayross, 4th edition

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA255

Course Title: FUNDAMENTALS OF COMPUTER ALGORITHMS
Pre-requisite(s): Knowledge Of Basic Mathematics (Graph Theory) And Data Structures
Co- requisite(s):
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: BCA
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

6.	To understand basic algorithm designing techniques such as recursion, greedy, backtracking and branch and bound.
7.	To analyze the asymptotic performance of an algorithm.
8.	To demonstrate a familiarity with algorithms and data structures..
9.	To apply important algorithmic design paradigms and methods of analysis in solving real life problems.
10.	To Synthesize efficient algorithms in common engineering design situations.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Students will be able to have a clear understanding on solving the problems systematically.
CO2	Students will be able to make use of linear and non-linear data structures, like, graphs and trees while designing algorithms.
CO3	Students will be having a clear understanding of different design paradigms..
CO4	Students will be able to analyze and measure the efficiency of an algorithm
CO5	Students will have basic knowledge of fundamentals of algorithms which would help them to take up an advanced course in the same field.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Introduction:** What is an algorithm? Design and performance analysis of algorithms, space and time trade-offs. Analysis of selection sort and insertion sort. Asymptotic notations (O, è, ¿,ωo) to measure complexity of algorithms.	**8**
Module – II **Recursion:** Basic concept. Analysis of recursive algorithms, Master's theorem. Divide & Conquer: The general method. binary search, finding the maximum and minimum, merge sort, quick sort, Best and worst case analysis for the mentioned algorithms.	**8**
Module – III **The Greedy Method:** The general method. Applications to Knapsack problem, minimum weight spanning trees: Prim's & Kruskal's algorithms. Dijkstra's algorithm for finding single source shortest paths problem.	**8**
Module – IV **Algorithms on Graphs:** **Br**eadth First Search, Depth First Search, Biconnectivity, Depth First Search of a Directed Graph, Topological Sorting.	**8**
Module – V **Basic concepts of Backtracking:** 8-queen problem, Branch and Bound: 0/1 Knapsack problem, assignment problem**.**	**8**

Text Books:

1. CormenThomas H., LeisersonCharles E., & Rivest.Ronald L., "Introduction to Algorithms PHI publication.
2. Horowitz Ellis, Sahni Sartaj and Rajasekaran S., "Fundamentals of Computer Algorithms" Galgotia publications.

Reference Books:

3. Aho Alfred V., Hopcroft John E. & Ullman Jeffrey D., "The Design & Analysis of Computer Algorithms", Addison Wesley Publications.
4. Kleinberg Jon & Tardos Eva, "Algorithm Design", Pearson Education Publications.
5. Brassard Gilles & Bratley Paul, "Fundamentals of Algorithms", PHI Publications.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Dynamic Programming design paradigm.

POs met through Gaps in the Syllabus

3, 4, 5

Topics beyond syllabus/Advanced topics/Design

NIL

POs met through Topics beyond syllabus/Advanced topics/Design

N.A.

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	2	1	2	3	3	3	3
CO2	3	1	1	1	1	3	1	1	2	1	2	3	3	3	3
CO3	2	3	3	1	2	1	2	2	2	1	2	3	3	3	3
CO4	1	1	3	3	1	1	1	1	2	1	2	3	3	3	3
CO5	3	3	3	1	2	1	1	2	2		1	3	3	3	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD Code	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD2, CD 8
CD2	Tutorials/Assignments	CO2	CD1, CD2, CD8
CD3	Seminars	CO3	CD1, CD2, CD3, CD5, CD8
CD4	Mini Projects/Projects	CO4	CD1, CD3, CD8
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2, CD3, CD8
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA256
Course Title: WEB PROGRAMMING
Pre-requisite(s): HTML, XML
Co- requisite(s): Web Programming Lab
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: IV/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To learn about basics of web programming
B.	Learn HTML, Java Script, XML for scripting
C.	Learn web based programming using ASP.NET
D.	Learn PHP based programming
E.	Learn Making static and dynamic websites

Course Outcomes

After the completion of this course, students will be able to:

6.	Know the fundamentals of web programming
7.	Identify .NET technology and framework
8.	Elaborate on the web based programming
9.	Perform web based programming.
10.	Design static and dynamic websites

SYLLABUS

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Introduction to Internet and HTML**: Introduction to Internet, Internet Services, Web Server, Web Client, Domain Registration, Internet Security. HTML Tags, HTML Documents, Header Section, Body Section, Headings, Link Documents using Anchor Tag, Formatting Characters, Font tag, Images and Pictures, Listing, Tables in HTML.	**8**
Module – II **Java Script:**Data Types, Variables, Operators, Conditional Statements, Array Objects, Date Objects, String Objects**,** Use of Java Script in Web Pages, Advantages of Java Script, Type Casting, Array, Operators and Expression, Conditional Checking, Function, User Defined Function.	**8**
Module – III **Understanding XML:** Overview of XML, XML Families of Technology, Creating XML Documents, Rules for Well-Formed XML, Discerning Structure, Working with Mixed content, Adding Comments, CDATA Sections, Creating a DTD-The Concept of a Valid XML Document, Creating a DTD for an existing XML File.	**8**
Module – IV **ASP .NET:** Building Web Forms Using ASP .NET, Exploring ASP .NET Server Controls, Using ASP .NET Server Controls to Create Web Forms, Understanding the Code behind the Page. Working with User Controls, Exposing User Control Properties and Methods, Using ASP .NET Server Controls in User Controls, Using Validation Controls to Improve Web Forms, Uploading Files to a Web Server.	**8**
Module – V **PHP:** Preparing the Use PHP, Exploring PHP for the First Time, Understanding PHP Basics, Displaying PHP Output, Managing PHP Program Flow. Planning a PHP Web Application, Creating and Using a Logon Window, Managing System Data, Updating a PHP Web Application.	**8**

TEXT BOOKS

1. XavierC., "Web Technology & Design", New Age International Publishers, 1st Edn, New Delhi, 2004.
2. BaiXue, Ekedahl Michael, FarrellJoyce, GosselinDon, ZakDiane, KaparthiShashi, MacintyrePeter, Morrissey Bill, "The Web Warrior Guide to Web Programming", India Edition, Thomson Education.

REFERENCE BOOK

1. RossIvan Bay, "Web Enable Commercial Application Using HTML, DHTML", BPB Publication.

Gaps in the Syllabus (to meet Industry/Profession requirements)

13. Detailed learning of HTML and XHTML
14. Detailed learning of JavaScript
15. Detailed learning of XML

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

15.Concepts of XSLT
16.Knowledge about Active Server Pages
17.Designing interactive server pages

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA258
Course Title: SOFTWARE ENGINEERING
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: IV
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students :

1.	To understand the importance, limitations and challenges of processes involved insoftware development
2.	To gain knowledge of various software models.
3.	To learn about software requirements analysis and specification
4.	To gain knowledge of various software design activities
5.	To learn cost estimation, software testing, maintenance and debugging.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Identify the difference of software engineering discipline with the other engineering disciplines
CO2	Elaborate knowledge of various software models
CO3	Analyse about software requirements analysis and specification
CO4	Infer from knowledge of various software design activities.
CO5	Implement cost estimation, software testing, maintenance and debugging.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)

Module – I Introduction: S/W Engineering Discipline-Evolution and Impact, Program vs S/W Product Emergence of S/W Engineering. Software Life Cycle Models: Waterfall, Prototyping, Evolutionary, Spiral models and their comparisons. Software Project Management: Project Manager responsibilities, Project Planning, Project Size Estimation Metrics, Project estimation Techniques, COCOMO, Staffing Level Estimation, Scheduling, Organization& Team Structures, Staffing, Risk Management, S/W Configuration Management.	**8**
Module – II Requirements Analysis and Specification: Requirement Gathering and Analysis, SRS Software Design: Overview, Cohesion and Coupling, S/W Design Approaches, Object-Oriented vs. Function-Oriented Design. Function-Oriented S/W Design: SA/SD Methodology, Structured Analysis, DFDs, Structured Design, Detailed Design	**8**
Module – III Object Modelling Using UML: Overview, UML, UML Diagrams, Use Case Model, Class Diagrams etc.Object-Oriented Software Development: Design Patterns, Object-Oriented analysis and Design Process, OOD Goodness Criteria. User Interface Design: Characteristics, Basic Concepts, Types, Components Based GUI Development, User Interface Design Methodology	**8**
Module – IV Coding and Testing: Coding, Code Review, Testing, Unit Testing, Black Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing, General Issues. Software Reliability and Quality Management: S/W Reliability, Statistical Testing, S/W Quality, S/W Quality Management System, ISO 9000, SEI CMM, Personal Software Process, Six Sigma	**8**
Module –V Software Maintenance: Characteristics, S/W Reverse Engineering, S/W Maintenance Process Models, Estimation of Maintenance Cost**.**	**8**

Text Books:

1. MallRajib, “Fundamentals of Software Engineering”, PHI, 2005

Reference Books:

1. Pressman, "Software engineering A Practitioner's Approach", MGH.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. It is not possible to teach students all the methods and practices employed by practitioners.

2. Software engineering is dynamic disciplines that have continuous growth in research in identifying new methods, tools and methodologies that have cause vast improvement in software development and maintenance to be more reliable and efficient.

3. To improve the quality of software are increasing due to the competition in software industry and the complexity of software development

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. **Model-driven software development**
2. **Aspect-oriented software development**
3. **Software engineering for security**
4. **Metamodeling**
5. **UML profiles**

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2				2	2	3	3
CO2	3	1	1	1	1	3	1	1				2	2	3	2
CO3	2	3	3	1	2	1	2	2		1	1	2	3	2	3
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CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA257

Course Title: WEB PROGRAMMING LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To learn about basics of web programming
B.	Learn HTML, Java Script, XML for scripting
C.	Learn web based programming using ASP.NET
D.	Learn PHP based programming
E.	Learn Making static and dynamic websites

Course Outcomes

After the completion of this course, students will be able to:

1.	Know the fundamentals of web programming
2.	Identify .NET technology and framework
3.	Elaborate on the web based programming
4.	Perform web based programming.
5.	Design static and dynamic websites

SYLLABUS

1. India is a large country. Different regions observe variations in climate. The spoken language of one state is quite different from that of another. They wear different types of garments. They celebrate different festivals and perform varied religious rites. People belonging to diverse cultures belong to different religious faiths. In spite of these diversities, Indians feel a sense of unity and oneness among them. Thus, we conclude that India is a land of Unity in Diversity.
    a) All the headings should be H2 and green colour.
    b) Main heading should be H1 and centre aligned.
    c) The background should be yellow colour.
    d) There are 10 paragraphs so each of them should be made using P tag.
    e) The Introduction and Conclusion paragraphs should have "Times New Roman" font, the size should be 12 and colour should be blue.
    f) All the remaining paragraphs text should be pink and magenta coloured in an alternate way.
    g) There should be one meaningful picture in the web page with specific dimension.
2. Create a webpage having a list as shown below:

    - **Food**
        a. Fruit
            - Apple
            - Mango
            - Pear
        b. Vegetable
            - Potato
            - Tomato
            - Carrot
    - **Dress**
        a. Ethnic wear
            - Kurta
            - Sherwani
        b. Western wear
            - suit
            - jeans
    - **Sports**
        a. Indoor sports
            - carom
            - table tennis
        b. Outdoor sports
            - Cricket
            - Hockey
3. Create a webpage with the following:

    a) A superscript and subscript tag
    b) Pre tag

c) Paragraph tag
d) Anchor tag
e) Image tag
f) Definition list tag
g) Marquee tag
h) Horizontal line tag
i) Break tag
j) Heading tag

4. Create a webpage having 10 divisions each having separate background color and text color using
<DIV> tag. At the top right corner there should be an image hyperlink opening in a new webpage.

5. Create a webpage with a form loaded into it and take input of three strings through three textboxes and then concatenate them without using any built-in function.

6. Create a webpage with two tables. First one should have 1 row and 5 columns and the second one with 3 rows and 4 columns. The contents of the first table should be center aligned and contents of the second table should be right aligned. Each column of the first table should have separate
colors and each row of the second table should have separate colors.

7. Write a JavaScript program to calculate and display the aggregate and percentage of three subjects' (Physics, Chemistry and Mathematics) marks along with the name of a student. The name and individual marks input shall be taken by textbox in the webpage.

8. Write a JavaScript program to search the element 4 in the array [2, 6, 4, 10, 4, 0, -2] using any method.
9. Create a framed webpage with different frames as below:

1	2	3
4		5
6	7	8

Contents of 1st, 3rd, 5th, 7th frame should be same again 2nd, 4th, 6th and 8th should be same.

4. Create a webpage to take input of a string and check whether it is a palindrome or not.
5. Write a program using JavaScript to display a structure as given below:

```
*
* *
* * *
* * * *
* * * * *
```

6. Write a program using JavaScript to take input of an array of numbers like [-4, 5, 6, -1, 10] and then sort it in descending order.
7. Create a webpage to take input of a string and reverse that without using any user defined function.
8. Write a JavaScript program to search 10 in the array [2, 6, -5, 10, 11, 0, -2] using a binary search method.
9. Write a JavaScript program to take two arrays like [3, 7, 1, 6, 2, 3] and [5, 6, 0, -3] and merge them into third array along with that remove the repetitive elements.
10. Write a JavaScript program to calculate the percentage of three subjects' (English, Mathematics, and Science) marks along with the name of a student. The name and individual marks input shall be taken by form in the webpage.
11. Create a webpage to take input of a string and count the number of vowels in it.
12. Create a webpage to take input of two strings and concatenate them without using any built-in function.
13. Create a webpage to take input of a string and then slice it into three separate strings and display that.
14. Write a JavaScript program to take two arrays like [1, 3, 8, 1, 6, 2, 3] and [2, 1, 5, 6, 0, -3] and merge them into third array along with that remove the repetitive elements.
15. Write a JavaScript program to calculate and display the aggregate and percentage of three subjects' (Physics, Chemistry and Mathematics) marks along with the name of a student. The name and individual marks input shall be taken by textbox in the webpage.
16. Create a webpage to take input of a string and check whether it is a palindrome or not.

Gaps in the Syllabus (to meet Industry/Profession requirements)

4. Application of principles of magnetic circuits to electrical machines like transformers, generators and motors.
5. Field applications of three phase equipment and circuits in power system.
6. Applications of circuit theorems in electrical and electronics engineering.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

18. Concepts of electric, magnetic and electromagnetic fields
19. 3 - Φ power generation and transmission
20. Power factor improvement for three phase systems
21. Utility of reactive power for creation of electric and magnetic fields

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA259
Course Title: SOFTWARE ENGINEERING LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

6.	To understand the concept of UML
7.	To gain knowledge of various diagrams.
8.	Learn about software requirement specification.
9.	To gain knowledge about software design specification
10.	To learn about the relationships among different UML diagrams.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Identify the software requirement capturing process.
CO2	Elaborate knowledge about dynamic view of system.
CO3	Analyse about static view of software system.
CO4	Analysis about the relationship among static and dynamic view of system.
CO5	Identify the process of deployment of software system

SYLLABUS

List of Programs as Assignments

1. Draw use case diagram for online banking system.

2. Draw use case diagram for online library system

3. Draw use case diagram for online railway reservation system

4. Draw use case diagram for employee information system.

5. Draw use case diagram for inventory control system

6. Draw use case diagram for student information system.

7. Draw use case diagram for online hotel management system.

8. Draw use case diagram for online bus reservation system.

9. Draw use case diagram for online course registration system

10. Draw use case diagram for online teacher information system.

11. Draw sequence diagram for online banking system.

12. Draw sequence diagram for online library system.

13. Draw sequence diagram for online railway reservation system.

14. Draw sequence diagram for employee information system.

15. Draw sequence diagram for inventory control system.

16. Draw sequence diagram for student information system.

17. Draw sequence diagram for online hotel management system.

18. Draw sequence diagram for online bus reservation system.

19. Draw sequence diagram for online course registration system.

20. Draw sequence diagram for online teacher information system.

21. Draw activity diagram for online banking system.

22. Draw activity diagram for online library system.

23. Draw activity diagram for online railway reservation system.

24. Draw activity diagram for employee information system.

25. Draw activity diagram for inventory control system.

26. Draw activity diagram for student information system.

27. Draw activity diagram for online hotel management system.

28. Draw activity diagram for online bus reservation system.

29. Draw activity diagram for online course registration system

30. Draw activity diagram for online teacher information system.

31. Draw class diagram for online banking system.

32. Draw class diagram for online library system

33. 33. Draw class diagram for online railway reservation system

34. Draw class diagram for employee information system.

35. Draw class diagram for inventory control system

36. 36.. Draw class diagram for student information system.

37. Draw class diagram for online hotel management system.

38. Draw class diagram for online bus reservation system.

39. Draw class diagram for online course registration system .

40. Draw class diagram for online teacher information system

Text Books:

1.MallRajib, "Fundamentals of Software Engineering", PHI, 2005.

Reference Books:

1. Pressman, "Software engineering A Practitioner's Approach", MGH**.**

Gaps in the Syllabus (to meet Industry/Profession requirements)

7. Estimation of software scope feasibility and resources.
8. Develop architectural diagram, and implement by following coding principles.
9. Apply testing strategies and handle software product maintenance issues.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. Gather and analyze system requirements
2. Develop process models and process system models
3. Translating design into coding.
4. Applying different testing stategies

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1				2	2	3	3
CO2	3	3	3	1	3	1	1	1				2	3	2	3
CO3	3	3	3	3	3	1	2	2		1	1	2	3	3	2
CO4	3	3	3	1	3		1	1		1	1	2	2	3	2
CO5	3	3	3	3	3	1	1	1	1	1	1	2	3	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD7, CD 8
CD2	Tutorials/Assignments	CO2	CD1 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD3
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		

CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA301
Course Title: COMPUTER GRAPHICS AND MULTIMEDIA
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Acquire fundamental knowledge of role of multimedia and graphics in computer science.
B.	Learn various object modelling algorithms and computations related to it.
C.	Learn to model and colour 2D and 3D objects
D.	Learn to develop simple Graphical User Interface
E.	Learn about graphics system and corresponding display methodologies.

Course Outcomes

After the completion of this course, students will be able to:

1.	Can perform visual computations for geometrical drawings.
2.	Can model 2D objects.
3.	Apply geometrical transformation of the modelled objects.
4.	Can develop simple Graphical User Interface.
5.	Design multimedia applications

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Introduction to Graphics Systems**: Video Display Devices, Raster Scan Systems, Random Scan Systems, Graphics Monitors and Workstations, Input Devices, Hard Copy Devices, Graphics Software. Three-Dimensional Viewing Devices, Stereoscopic & Virtual Reality Systems	**8**
Module – II **Output Primitives**: Points and Lines, Line Drawing Algorithms (DDA and Bresenham's Algorithms), Loading the Frame Buffer, Circle Generating Algorithm, Filled Area Primitives – Scan-line Polygon Fill Algorithm, Boundary-Fill Algorithm, Flood-Fill Algorithm, Color Tables.	**8**
Module – III **2D Transformation and Viewing**: Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations (Translations, Rotations, Scalings), Other Transformations (Reflection and Shear), The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to- Viewport Coordinate Transformation, Clipping- Point, Cohen-Sutherland Line Clipping and Sutherland-Hodgeman Polygon Clipping.	**8**
Module – IV **Three-Dimensional Geometric Transformations**: Translation, Rotation, Scaling.	**8**
Module – V **Introduction to Multimedia Systems and Multimedia Components**: Multimedia Systems, Multimedia Presentation and Production, Characteristics of Multimedia Presentation, Uses of Multimedia. CD Formats, DVD, DVD Formats. Text and its File Formats, Image Types and File Formats, Fundamental Characteristics of Sound, Audio File Formats, Video, Transmission of Video Signals, Video File Formats.	**8**

TEXT BOOKS

1. HearnD. and BakerM. P., "Computer Graphics: C Version", 2nd Edition, Pearson Education, 2007.

2. BufordJ. F. K., “Multimedia Systems”, 1st Edition, Pearson Education, 2005.

REFERENCE BOOKS

1. FoleyJ. D., DamA. Van, Feiner S. K. and HughesJ. F., “Computer Graphics: Principles and Practice in C”, 2nd Edition, Pearson Education, 2000.
2. ParekhR., “Principles of Multimedia”, 2nd Edition, Tata McGraw Hill, 2012.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher’s Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA303
Course Title: COMPUTER NETWORKS
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To build an understanding of the fundamental concepts of the data communication model and communications architecture.
B.	To study characteristics of communication mediums and the characteristics of signals propagated through different transmission media, including concepts of transmission impairments.
C.	To understand the basic principles of signal encoding techniques, error-detection, and error-correction techniques.
D.	To understand techniques for flow control and multiplexing for maximum utilization of bandwidths in the data communications process.
E.	To understand the various switching techniques and routing techniques for efficient transmission.

Course Outcomes

After the completion of this course, students will be able to:

1.	Understand and be able to explain the principles of a layered protocol architecture; be able to identify and describe the system functions in the correct protocol layer and further describe how the layers interact.
2.	Understand, explain and calculate digital transmission over different types of communication media.
3.	Understand, explain and solve mathematical problems for data-link and network protocols.
4.	Describe the principles of access control to shared media and perform performance calculations.
5.	Understand and explain the principles and protocols for route calculations and be able to perform such calculations.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Network**: Needs and **Adv**antages, Network Hardware, Network software, Classification of Networks: LAN, MAN, WAN, Network Topology: Bus, Star, Ring, Star bus, Star ring, Mesh – Features, Advantages and disadvantages of each type.	**8**
Module – II **Transmission Media**: Wired & Wireless transmission, properties & speciality of various media, **ConnectivityDevices**: Modem, Repeater, NIC, Network adapters, Connectors, Transceiver, Hub, Bridge, Switches, Routers and Gateways, **Network Architecture**: Layering and Design, OSI Reference Model, TCP/IP Model, SNA	**8**
Module – III **Physical Layer**: Functions and Services, Interface: EIA 232 D Interface, DTE/DCE Interface, Null Modem, Physical Layer Standard. Multiplexing: FDM & TDM	**8**
Module – IV **Data Link Layer**: Functions, Error control: Error Detection and Correction Techniques), Flow Control: Stop and Wait & Sliding Window Flow controls. Protocols: HDLC. **Network Layer**: Need and Services, Internetworking Principles, Internet Protocol(IPv4), Routing, Congestion Control.	**8**
Module – V **Local Area Network**: Ethernet, Fast Ethernet, Token Rings, FDDI, ATM, IEEE 802 standards: 802.3, 802.4, 802.5 **Network Security:** Network security issues, approaches to network security, hacking. Firewalls: types of firewall technology- network level and application level, limitations of firewalls. Encryption and Decryption (Basic concepts)	**8**

TEXT BOOK

1. TanenbaumAndrew S, “Computer Networks”, Pearson Education, New Delhi.

REFERENCE BOOKS

1. ComerD E, “Computer Networks and Internet”, 2nd Edition, Pearson Education, New Delhi.
2. GuptaPrakash C, “Data Communication & Computer Networks”, PHI, New Delhi.
3. Forouzan B., “Data Communications and Networking”, 3rd edition, Tata McGraw-Hill Publications.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher’s Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty
2.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA304
Course Title: MANAGEMENT INFORMATION SYSTEMS
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To know the role of Information Systems in Business Today.
B.	To know what is an Information System.
C.	To understand how Businesses Use Information Systems:
D.	To know the basics of Information Systems, Organizations, and Strategy.
E.	To know the basics of Information Technology and Computers uses in Management Information Systems.

Course Outcomes

After the completion of this course, students will be able to:

1.	Identify the role of Information Systems in Business Today.
2.	Analyse what is an Information System.
3.	Assess Information Systems, Organizations, and Strategy.
4.	Elaborate on the uses Computers and IT in Management Information Systems.
5.	Apply the impacts of MIS in Business Decision Makings.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Information Systems in Global Business Today:** The role of Information System in Business Today, How Information Systems Are Transforming Business, What's New in Management Information Systems?, Globalization Challenges and Opportunities: A Flatted World, The Emerging Digital Firm, Strategic Business Objectives of Information Systems, Perspectives on Information Systems, What is an Information System?, Dimensions of Information Systems, It Isn't Just Technology: A Business Perspective on Information Systems.	**8**
Module – II **E-Business: How Businesses Use Information Systems:** Business Processes and Information Systems, Business Processes, How Information Technology Enhances Business Processes, Types of Information Systems, Transaction Processing Systems, Management Information Systems and Decision-Support Systems, Systems That Span the Enterprise, Enterprise Applications, Intranets and Extranets, Collaboration and Communication Systems: "Interaction" Jobs in a Global Economy, E-Business, The Information Systems Function in Business.	**8**
Module – III **Information Systems, Organizations, and Strategy:** Organizations and Information Systems, What Is an Organization?, Features of Organizations, How Information Systems Impact Organizations and Business Firms, Economic Impacts, Organizational and Behavioural Impacts, The Internet and Organizations, Implications for the Design and Understanding of Information Systems, Using Information Systems to Achieve Competitive Advantage, Porter's Competitive Forces Model.	**8**
Module – IV **IT Infrastructure and Emerging Technologies:** IT Infrastructure, Defining IT Infrastructure, Evolution of IT Infrastructure, Technology Drivers of Infrastructure Evolution, Infrastructure Components, Computer Hardware Platforms, Operating System Platforms, Enterprise Software	**8**

Applications, Data Management and Storage, Networking/ Telecommunication Platforms, Internet Platforms, Consulting and System Integration Services, Contemporary Hardware Platform Trends, The Emerging Mobile Digital Platform, Grid Computing, Cloud Computing and the Computing Utility, Autonomic Computing.	
Module – V **Enhancing Decision Making:** Decision Making and Information Systems, Business Value of Improved Decision Making, Types of Decisions, The Decision Making process, Managers and Decision Making in The Real World, Systems for Decision Support, Management Information System(MIS), Decision-Support Systems(DSS), Web-Based Customer Decision-Support Systems, Group Decision-Support Systems(GDSS), Executive Support Systems(ESS). **Case Studies:** Two Recent Case Studies to be Discussed Fully Covering the Whole Syllabus.	**8**

TEXT BOOK

1. Laudon K. and Laudon J.,"Management Information Systems", Prentice Hall Publication.

REFERENCE BOOKS

1. Murdick, Ross and Claggett, "Information Systems for Modern Management", PHI Publication.
2. Jawadekar W. S., "Management Information Systems", Tata McGraw Hill Publication.
3. GoyalD. P., "Management Information Systems Managerial Perspectives", Macmillan India Ltd.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Status of MIS in Indian Industry.
2. Effectiveness of MIS: A Case Study.

POs met through Gaps in the Syllabus

2, 3,6

Topics beyond syllabus/Advanced topics/Design

3. MIS design issues.
4. **MIS Development of an organization.**

POs met through Topics beyond syllabus/Advanced topics/Design

1, 2, 3, 6, 7, 8

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10

Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA302
Course Title: COMPUTER GRAPHICS LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	To learn computer graphics by practical
2.	To Learn coding for various graphics tools.
3.	To learn the various theory by implementation using programming
4.	To identify the limitations of C Language for graphics related problem.
5.	To know the practical application of computer graphics.

Course Outcomes

After the completion of this course, students will be able to:

CO1	To code programs efficiently.
CO2	To translate the graphics algorithm to programs.
CO3	To test and execute the graphical syntax and logical errors.
CO4	To apply programming to solve simple graphical problems using functions.
CO5	To write the C program efficiently for transformation problems.

SYLLABUS

list of programs as assignments:

write programs using ***c language***

1. To get the background color.
2. To set the background color.
3. To plot a point of co-ordinate (100,100).
4. To draw a line using the line function.
5. To draw a line using the line function. take the end co-ordinates from the user.
6. To draw a triangle using the polygon function.
7. To draw a polygon of 'n' edges using polygon function.
8. To draw a polygon of 'n' edges taken from the user using the polygon function.
9. To draw a circle using the circle function.
10. To draw a circle of radius 'r' taken from the user using the circle function.
11. To draw a line using dda algorithm.
12. To draw a line using bresenham's line algorithm.
13. To draw a circle using midpoint circle algorithm.
14. To draw a line using bresenham's line algo, where end points are taken from the user.
15. To draw a line using dda algo, where end points are taken from the user.
16. To draw 'n' concentric circles taken from user using midpoint algorithm.
17. To create a line and translate it.
18. To create a line and increase its size with a value taken from user.
19. To create an equilateral triangle.
20. To draw a line and rotate it with angle of 45.
21. To create a circle and translate it.
22. To create a circle and translate it with a value taken from user.
23. To create an equilateral triangle and rotate it with angle of 45.
24. To create an equilateral triangle and create reflection.
25. To scale a rectangle.
26. To shear a rectangle. take the shear factor from the user.
27. To create an equilateral triangle and translate, rotate and scale it.
28. To draw a line with shear and translation.
29. Draw bar chart.
30. Draw pie chart.

TEXT BOOK

1. Roger T. Stevens, Advanced Graphics Programming in C and C++, BPB Publication

2. Donald Hearn, M. Pauline Baker, Computer Graphics, C Version, Prentice Hall Publication
3. https://www.programmingsimplified.com/c/graphics.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
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CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA355
Course Title: DATA MINING
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: VI/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	Understand the need of data mining activities.
2.	ntify the methods of pre-processing data and performing activates related to ETL.
3.	Know the various applications of data mining.
4.	To familiarize the concepts of Data mining
5.	To decide what data mining activities are required to obtain the desired objectives.

Course Outcomes

After the completion of this course, students will be able to:

1.	Identify data mining related applications and activities
2.	Assess the problem and decide what data mining activities are required to obtain thedesired objectives.
3.	Mathematically perform pre-processing operations on datasets to ensure the validity of the data is improved.
4.	Analyse and evaluate algorithms for performing common data mining
5.	Apply Data mining methods for performance and optimization issues

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Introduction:** What is data mining? Motivating challenges. The origins of data mining. Data mining tasks. Data: Types of Data. Attributes and Measurement. Types of Data Sets. Data Quality Measurement and Data Collection Issues.	**8**
Module – II **Measures of Similarity and Dissimilarity:** Basics. Similarity and Dissimilarity between Simple Attributes. Dissimilarities between Data Objects. Similarities between Data Objects. Examples of Proximity Measures. Issues in Proximity Calculation. Selecting the Right Proximity Measure.	**8**
Module – III **Association Analysis:** Basic Concepts and Algorithms Preliminaries. Frequent Itemset Generation. The Apriori Principle. Frequent Itemset Generation in the Apriori Algorithm. Candidate Generation and Pruning Support Counting. Rule Generation.	**8**
Module – IV **Cluster Analysis:** Basic Concepts and Algorithms. What Is Cluster Analysis? Different Types of Clustering. Different Types of Clusters. K-means. Basic K-means Algorithm. Basic Agglomerative Hierarchical Clustering Algorithm. Key Issues in Hierarchical Clustering. The DBSCAN Algorithm.	**8**
Module – V **Classification:** Basic Concepts and Techniques. General Framework for Classification. Decision Tree Classifier. A Basic Algorithm to Build a Decision Tree. Methods for Expressing Attribute Test Conditions. Measures for Selecting an Attribute Test Condition. Algorithm for Decision Tree Induction. Characteristics of Decision Tree Classifiers. Model Evaluation.	**8**

TEXT BOOK

1. Tan Pang-Ning, Steinbach Michael, andKumar Vipin , “Introduction to Data Mining”, Pearson Education, New Delhi.

REFERENCE BOOKS

1. Han Jiawei & Kamber Micheline, “Data Mining Concepts & Techniques”,

Publisher Harcourt India. Private Limited, Second Edition
2. Dunham H.M. & Sridhar S., "Data Mining", Pearson Education, New Delhi, 2006.

Gaps in the Syllabus (to meet Industry/Profession requirements)

10. Use of massive data to implement all the data mining concepts.
11. Interaction with domain knowledge concepts with the actual algorithmic implementation.
12. Handling various data using same data mining algorithms.

POs met through Gaps in the Syllabus

1, 3, 4, 12

Topics beyond syllabus/Advanced topics/Design

5. Text Mining
6. Outlier Mining
7. Advanced clustering algorithms

POs met through Topics beyond syllabus/Advanced topics/Design

1, 2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
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CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA356
Course Title: DISTRIBUTED COMPUTING
Pre-requisite(s): Computer Network, Operating System
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: VI/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students to:

A.	Know about Different forms of Computing.
B.	UnderstandInterprocess Communications.
C.	Learn and understand Distributed Computing Paradigms.
D.	Know about The Client Server Paradigm.
E.	Implement Distributed Objects.

Course Outcomes

After the completion of this course, students will be able to:

1.	Justify the presence of concurrency within the framework of distributed system.
2.	Explain the range of requirements that modern distributed systems have to address.
3.	Describe how the resources in a parallel and distributed system are managed by software
4.	Understand the memory hierarchy and cost-performance trade-offs.
5.	Explain what virtualization is and how it is realized in hardware and software.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Distributed Computing Concept:** Definitions, The history of distributed computing, Different forms of computing, The strengths & weaknesses of distributed computing, Basics of operating systems, Network basics, Software engineering basics. Event synchronization, Timeouts and threading, Deadlocks, Data representation, Data marshalling, Event diagram and sequence diagram, IPv4 & IPv6, Connection – oriented versus connectionless IPC.	**8**
Module – II **Distributed Computing Paradigms:** Paradigms and Abstraction, Message Passing, The Client-Server Paradigm, the Message System Paradigm, Remote Procedure Call Model, RMI, The Distributed Objects Paradigm, The Object space, The Mobile Agent Paradigm.	**8**
Module – III **The Socket API:** The Socket metaphor in IPC, The Datagram Socket API, The Stream-Mode Socket API, Sockets with nonblocking I/O Operations, Secure Socket API. The client server paradigm issuers, connection- oriented and connectionless servers, Iterative server and concurrent server, stateful server and stateless server.	**8**
Module – IV **Distributed Objects:** Remote Procedure Calls, Distributed Objected Systems, Remote Method Invocation, The Java RMI Architecture, The API for the Java RMI, RMI Security Manager, Comparison of RMI Remote Procedure Calls, Distributed Objected Systems, Remote Method Invocation, The Java RMI Architecture, The API for the Java RMI, RMI Security Manager, Comparison of RMI and Socket APIs.	**8**
Module – V **Group Communication:** Unicasting versus Multicasting, Multicast API, Connectionless versus Connection-oriented Multicast, Reliable Multicasting	**8**

versus Unreliable Multicasting, The Java Basic Multicast API.	

TEXT BOOK

1. Liu M. L., "Distributed Computing: Principles and Application", Pearson Education, 2008.

REFERENCE BOOK

1. AltiyaH., WelchJ., "Distributed Computing Fundamentals, Simulations and Advanced Topics", 2nd edition, Wiley – India Edition, 2006.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1.Load balancing has not been addressed.
2.RMI technology has not be discussed in detail.

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3

CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA360
Course Title: PROJECT
Credits: 6

LIST OF PROGRAM ELECTIVES

PROGRAM ELECTIVE I (PE I)

Course Code: CA220
Course Title: INTERNET TECHNOLOGIES
Pre-requisite(s): Computer Network and Web Technology
Co- requisite(s): IT LAB
Credits: 4 L:3 T:1 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To learn about basics of Internet Technologies.
B.	Learn XML
C.	Learn Server Side Programming.
D.	Learn Java Servlet.
E.	Apply Internet based Programming and web applications.

Course Outcomes

After the completion of this course, students will be able to:

1.	Evaluate and analyse requirements of Internet technologies
2.	Compare among the existing web based programming concepts
3.	Create web based application.
4.	Interactive server side application.
5.	Implement dynamic web applications.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Internet Basics: Introduction to Internet, Client Server model, Internet IP Address, Domain Name, Domain Registration, Internet Services, A Brief Overview of TCP/IP and its Services, Hyper Text Transfer Protocol: Introduction, Web Servers and Clients, IP Address, Cyber Laws, URL and its Anatomy, Message format, Testing HTTP Using Telnet, Persistent and Non persistent Connections, Internet Security, Web Caching, Proxy.	**10**
Module – II History of HTML and W3C, HTML and its Flavours, HTML Basics, Elements, Attributes and Tags, Basic Tags, Advanced Tags, Frames, Images, Meta Tag, Planning of Web Page, Model and Structure for a Website, Designing Web Pages, Multimedia Content Frames, Cascading Style Sheet:Introduction,Advantages, Adding CSS, Browser Compatibility, CSS and Page Layout, Selectors	**10**
Module – III XML Technologies: Common Usage, Role of XML,Prolog,Body, Elements, Attributes, Validation, Displaying XML, Namespace. XML DTD: XML Schema Languages, validation, Introduction to DTD, Purpose of DTD, Using a DTD in an XML Document, Element Type Declaration, Attribute Declaration, Entity Declaration. Parsing XML: XML DOM, DOM Nodes, The Node Interface, Document Node, Element Node, Text Node, Attr Node, Java and DOM	**7**
Module – IV Server Side Programming: Servlet : Server –Side JAVA, Advantages Over Applets , Servlet Alternatives , Servlets Strengths , Servlet Architecture, Servlet life Cycle , Generic Servlet and Http Servlet, First Servlet , Passing Parameters to Servlets , Retrieving Parameters , Server side Include , Cookies, Filters, Problems with Servlet, Security Issues , Java Server Pages : Introduction and Marketplace , JSP and HTTP, JSP Engines, How JSP Works , JSP and Servlet, Anatomy of JSP page , JSP Syntax , JSP Components.	**8**
Module – V Session Tracking: User Passing Control and Data between Pages, Sharing	**5**

Session and Application Data, Data Base Connectivity, JDBC Drivers, Basic Steps, Loading a Driver, Making a connection, Execute an SQLStatement, SQl Statements, Retrieving Result, GettingDatabase Information, Scrollable and Updatable Result Set, Result Set Metadata.	

Text Books:

1. RoyUttam K., "Web Technology", Oxford University Press.

Reference Books:

1. EtalXue Bai, "The Web Warrior Guide to Web Programming", Thomson Learning, 2003.
2. XavierC., "Web Technology & Design", New Age International Publishers, 1st Edn, New Delhi, 2004.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

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1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA221
Course Title: I**NTERNET TECHNOLOGIES LAB**
Pre-requisite(s):
Co- requisite(s): Problem Solving And Programming In Html, Xml. Servlet , Jsp
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	To learn client side web programming
2.	To Learn GUI design at client side
3.	To learn the concept of web server
4.	To know the server side web programming
5.	To know the practical application of various server side programming techniques.

Course Outcomes

After the completion of this course, students will be able to:

CO1	To formulate client side HTML programming
CO2	To formulate XML web based applications
CO3	To configure web server
CO4	To apply programming concept to develop server side applications
CO5	To formulate server side applications to bind data bases.

SYLLABUS

List of Programs as Assignments:

1. Create a simple html file to demonstrate the use of different heading tags.
2. Create a simple html file to demonstrate different types of list.
3. Create a simple html file to create a table containing marks of 5 subjects of 10 students.
4. Design a html form for reserving a room in a hotel.
5. Create a html page with different types of frames such as floating frame, navigation frame & mixed frame.
6. Create a html form to find the railway fare from one place to another.
7. Create an XML structure with elements and attributes for Library information system.
8. Create an XML structure with elements and attributes for railway reservation system.
9. Create an XML document for student information system. Create a DTD and link the DTD to the XML document.
10. Create an XML document for employee information system. Create a DTD and link the DTD to the XML document
11. Create an XML schema for an XML file, which contains information about books that are available in the library.
12. Write a Servlet Program that displays server information (server name, port etc.).
13. Create a servlet program to retrieve the values entered in the html file.
14. Create a servlet program that takes your name and address from a HTML Form and displays it.
15. Write a program to show inter servlet communication between two servlets.
16. Create a simple servlet program to display the date and time.
17. Write a JSP program to output, "Welcome to JSP world."
18. Write a JSP page to display current time.
18. Write a JSP page that display a randomly generated number in first visit to this page and repeat displaying this same number in subsequent visits.
19. Write a JSP page to display current date.
20. Write a JSP page using <jsp:forward> to go to a servlet program which displays your name, date of birth and address.
21. Create a HTML form to take customer information (Name, Address, Mobile No.). Write a JSP program to validate this information of customers.
22. Write a jsp program to display student records stored in the database.
23. Create a form to record student details and store it into the database using jsp.
24. Write a program, using servlet and JDBC which takes students roll number and provides student information, which includes the name of the student, address, email-id, program of study, and
25. year of admission. You have to use a database to store student's information.
26. Write program of Q25. with login and password protection. Display a message if login and password are not correctly given.
27. Create a database of students. Write a program using jsp to display the name, course, semester for

those students who have more than 3 backlogs.

28. Create a database of students who are in the 5th Semester of the BCA. Write a program using JSP and JDBC to display the name and address of those students who are born after 1995.
29. Write a program using servlet and JDBC for developing an online application for the shopping of computer science books. You have to create a database for book title, author(s) of book, publisher, year of publication, price. Make necessary assumptions for book shopping.
30. Develop an application that collects/maintains the product information of an electronics goods production company in a database. Write a JSP page to retrieve information from the database on demand. Make necessary assumptions to develop this application.

Books recommended:

TEXT BOOK

1. Deitel,. P.J. Deitel, H.M. "Internet & World Wide Web How to Program", Pearson International Edition, 4th Edition.

REFERENCE BOOKS

1. Xavier C., "Web Technology & Design", New Age International Publishers, 1st Edn, New Delhi, 2004.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
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Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
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CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA222
Course Title: MOBILE APPLICATION
Pre-requisite(s): COMPUTER NETWORK, OPERATING SYSTEMS
Co- requisite(s): NONE
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: BCA
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

11.	To know about the mobile architecture with its different tires
12.	To know the mobile infrastructure and its components
13.	To adopt existing application and mobilizing and upgrading them for further use.
14.	To learn to compare mobile and native applications
15.	To gain knowledge of different architecture.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Be competent with the characterization and architecture of mobile applications.
CO2	Be competent with understanding enterprise scale requirements of mobile applications
CO3	Be competent with designing and developing mobile applications. 4
CO4	Be competent with comparatively evaluating the capabilities
CO5	Be exposed to technology and business trends impacting mobile applications

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Introduction, Developing Mobile Applications, Going Mobile, People Perspective, Mobilizing the Enterprise**.**	**8**
Module – II Mobile Application Architectures, Client-Server layers and Tires, Client thin and fat & web page Hosting, Server one, two and three tire architecture, Connection type with always, partially and never connect, Good Architectural Design Tenets	**8**
Module – III Mobile Infrastructure, Mobile Device Types, Mobile Device Components, Connection Methods	**8**
Module – IV Mobile Client Applications, Thin Client, Fat Client, Web Page Hosting, Best Practices	**8**
Module – V Mobilizing existing application architectures. Evolution of Enterprise Architectures, Anatomy of Enterprise Web Architecture, Considerations When Mobilizing Existing Applications, Types of Mobile Applications, Mobile Web Apps Versus Native Applications, Mobile Web Apps Versus Native Applications, Mobile 2.0	**8**

Text Books:

1. SchellRobbie, SchneiderHeather, LeeValentino, “Mobile Applications: Architecture, Design, and Development”, Prentice Hall 2004.
2. FlingBrian, “Mobile Design and Development”, O'Reilly Media, 2009.

Reference Books:

1. McWherterJeff, GowellScott, “Professional Mobile Application Development”, John Wiley & Sons 2012.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1.On-demand development apps

2.Motion and Location sensing

3. Application performance management

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. to promote efficiency through artificial intelligence
2. Surge of On-demand Apps
3. Integration of Wearable Apps
4. Real –time interaction between the service provider and customers.

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1				2	3	2	3
CO2	3	3	3	1	3	1	1	1				2	2	3	3
CO3	3	3	3	3	3	1	2	2		1	1	2	3	2	3
CO4	3	3	3	1	3		1	1		1	1	2	2	3	3
CO5	3	3	3	3	3	1	1	1	1	1	1	2	3	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD7, CD 8
CD2	Tutorials/Assignments	CO2	CD1 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD3
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		

CD9	Simulation		

PROGRAM ELECTIVE II (PEI II)

Course Code: CA 223

Course Title: ECOMMERCE TECHNOLOGY
Pre-requisite(s): General Idea of Computer Network & Internet Technology.
Co- requisite(s):
Credits: 4 L:3 T:1 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To know the basics of E - commerce .
B.	To understand Electronic Data Interchange
C.	To understand Security Issues of E- Commerce
D.	To understand Electronic Payment systems.
E.	To understand Internet Advertising

Course Outcomes

After the completion of this course, students will be able to:

1.	Able to learn E- Commerce perspectives.
2.	Able to learn Electronic Data Interchange.
3.	Able to learn Security majors of E- Commerce.
4.	Able to Manage & Learn Electronic Payment system.
5.	Able to use & Manage Internet Advertisements.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Introduction to E- Commerce:** What is E- Commerce, Impact of E-Commerce, Classification of E- Commerce, Application of E- Commerce technologies, E- Commerce Business Models, Frame work of V E-Commerce.	**8**
Module – II **Electronic Data Interchange (EDI)**: Conventional Trading process, what is EDI, Building Blocks of EDI Systems, Layered Architecture, value added networks, Benefits of EDI, Application of EDI.	**8**
Module – III **E- Commerce – Securing Business & Network Transactions:** Why Information on Internet Is Vulnerable?, Security Policy, Procedures & Practices, Site Security, Transaction Security, cryptology, Cryptographic algorithms, Public Key Algorithms, Authentication Protocols, Digital signature, Electronic Mail security, Security Protocols for Web Commerce	**8**
Module – IV **Electronic Payment Systems:** Introduction to Payment systems, Online Payment System, Prepaid Payment systems, Post Paid Payment Systems, Requirements metrics of a payment system.	**8**
Module – V **Internet Advertising:** Emergence of the Internet as a Competitive Advertising Media, Models of Internet Advertising, Banner Advertisements, Sponsoring content, Screen Savers & Push Broadcasting, Corporate website, Interstitials, SuperStitials, Opt-in's, Weaknesses in Internet Advertising.	**8**

TEXT BOOK

1. BhaskarBharat, "Electronic Commerce – Frame work, Technologies and Applications", Tata Mcgrow Hill, New Delhi.

REFERENCE BOOK

1. WhiteleyDavid, "E- Commerce Strategy, Technologies applications", TMH, New Delhi.
2. TurbanIrfan, Dennis veehland, David King, Joe lee, "E- Commerce – A Managerial

Perspective", Pearson Education Asia.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. E-Commerce business models.
2. Building an E-Commerce Web Site.
3. Ethical, Social, and Political Issues in E-Commerce.

POs met through Gaps in the Syllabus

1,3,5,6

Topics beyond syllabus/Advanced topics/Design

1. **Online Retailing and Services.**
2. **Online content and media.**

POs met through Topics beyond syllabus/Advanced topics/Design

1,3,7

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1.Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA271
Course Title: Soft Computing and Applications
Pre-requisite(s):
Co- requisite(s): None
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: BCA
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

16.	To understand the concept of fuzzy logic and controllers.
17.	To understand the various architectures of ANN and its learning methods.
18.	To learn about basic concepts of genetic algorithm and its operators.
19.	To understand the Artificial Neural Networks.
20.	To understand the Genetic Algorithms.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Solve numerical on Fuzzy sets and Fuzzy Reasoning.
CO2	Develop Fuzzy Inference System (FIS).
CO3	Solve problems on Genetic Algorithms
CO4	Explain concepts of neural networks
CO5	Develop neural networks models for various applications.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Fuzzy Set Theory:** Basic Definition and Terminology, Set Theoretic Operations, Fuzzy types and levels, MF Formulation and Parameterization, MF of two dimensions, Fuzzy Union, Intersection and Complement, Fuzzy Number, Fuzzy measure.	**8**
Module – II **Fuzzy Logic: Fuzzy Rules and Fuzzy Reasoning:** Extension Principles and Fuzzy Relations, Fuzzy IF THEN Rules, Defuzzification, Fuzzy Reasoning. Fuzzy Inference System: Introduction, Mamdani Fuzzy Models, Other Variants, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models.	**8**
Module – III **Fundamentals of Genetic Algorithms:** Basic Concepts, Creation of Offsprings, Encoding, Fitness Functions, Reproduction, Genetic Modelling: Inheritance Operators, Cross over, Inversion and detection, Mutation operator, Bitwise operators.	**8**
Module – IV **Introduction to Artificial Neural Networks**: What is a Neural Network? Human Brain, Models of Neuron, Neural Network viewed as Directed Graphs, Feedback, Network Architecture, Knowledge Representation, Learning processes:(Error correction, Memory-Based, Hebbian , Competitive, Boltzman ,Supervised,Unsupervised),Memory,Adaptation.	**8**
Module – V Perceptrons, Adaline, Back Propagation Algorithm, Methods of Speeding, Convolution Networks, Radical Basis Function Networks, Covers Theorem, Interpolation Learning, The Hopfield Network.	**8**

Text Books:

1. Jang J.S.R., Sun C.T. and Mizutani E., "Neuro-Fuzzy and Soft Computing" PHI/Pearson Education, New Delhi, 2004.
2. Rajasekaran S. & Vijayalakshmi, G.A. Pai, "Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications", PHI, New Delhi, 2003.
3. Ross T. J., "Fuzzy Logic with Engineering Applications", TMH, New York, 1997.
4. Haykins Simon, "Neural Networks:A Comprehensive Foundation", Pearson Education,2002.

Reference Books:

1. Ray K.S., "Soft Computing and Its application", Vol 1, Apple Academic Press.2015.
2. Lee K.H., "First Course on Fuzzy Theory and App.", Adv in Soft Computing Spinger.2005.
3. Zimmermann H.Z., "Fuzzy Set Theory and its App", 4thEdition, Spinger Science,2001.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Application of soft computing to develop and design the adaptive controllers.
2. Application of fuzzy inference system for prediction and modelling to complex problems.

POs met through Gaps in the Syllabus

3, 5

Topics beyond syllabus/Advanced topics/Design

1. Concepts and features of hard computing and soft computing.
2. NN- controller for an intelligent and autonomous robot.
3. Merits and Demerits of soft computing tools.

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 5

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA272
Course Title: Soft Computing using MATLAB /SCI LAB
Pre-requisite(s):
Co- requisite(s): None
Credits: 2 L: 0 T: 0 P: 4
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: BCA
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

21.	To understand the concept of fuzzy logic and controllers.
22.	To understand the various architectures of ANN and its learning methods.
23.	To learn about basic concepts of genetic algorithm and its operators.
24.	To understand the Artificial Neural Networks.
25.	To understand the Genetic Algorithms.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Solve numerical on Fuzzy sets and Fuzzy Reasoning.
CO2	Develop Fuzzy Inference System (FIS).
CO3	Solve problems on Genetic Algorithms
CO4	Explain concepts of neural networks
CO5	Develop neural networks models for various applications.

SYLLABUS

	QUESTIONS
1.	To perform Union, Intersection and Complement operations.
2.	Implementation of Fuzzy Relations (Max-min Composition).
3.	To implement De-Morgan's Law.
4.	To plot various membership functions.
5.	To implement FIS Editor.
6.	Implementation of Fuzzy Controller (Washing Machine).
7.	Implementation of Perceptron Learning Algorithm.
8.	Implementation of Unsupervised Learning Algorithm.
9.	Implementation of Simple Genetic Application.

Text Books:

1. Jang J.S.R., Sun C.T. and Mizutani E., "Neuro-Fuzzy and Soft Computing" PHI/Pearson Education, New Delhi, 2004.
2. Rajasekaran S. & Vijayalakshmi, G.A. Pai, "Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications", PHI, New Delhi, 2003.
3. Ross T. J., "Fuzzy Logic with Engineering Applications", TMH, New York, 1997.
4. Haykins Simon, "Neural Networks:A Comprehensive Foundation", Pearson Education,2002.

Reference Books:

1. Ray K.S., "Soft Computing and Its application", Vol 1, Apple Academic Press.2015.
2. Lee K.H., "First Course on Fuzzy Theory and App.", Adv in Soft Computing Spinger.2005.
3. Zimmermann H.Z., "Fuzzy Set Theory and its App", 4thEdition, Spinger Science,2001.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Application of soft computing to develop and design the adaptive controllers.
2. Application of fuzzy inference system for prediction and modelling to complex problems.

POs met through Gaps in the Syllabus

3, 5

Topics beyond syllabus/Advanced topics/Design

1. Concepts and features of hard computing and soft computing.
2. NN- controller for an intelligent and autonomous robot.
3. Merits and Demerits of soft computing tools.

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 5

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA273
Course Title: Data Analytics
Pre-requisite(s): Basic Programming
Co- requisite(s):
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04

Class: BCA
Semester / Level: PE II
Branch: BCA
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

26.	Understand business intelligence and data analytics.
27.	To understand the methods of pre-processing data and performing activates related to data analytics.
28.	Know the various applications of data analysis.
29.	Know the business data analysis through the powerful tools of data analytics.
5.	To decide what data analysis techniques are required to obtain the desired objectives.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Illustrate about business intelligence and data analytics.
CO2	Explore different aspects of data analysis technologies.
CO3	Elaborate the methods of data mining and creation of decision tree.
CO4	Implement data analysis through the powerful tools of data application.
CO5	Apply R to implement various data analytics.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Analysis using Descriptive and Pictorial Statistics: mean, median, mode, harmonic mean, geometric mean, variance and standard deviation, quantiles, skewness, moments and kurtosis. Data Visualization: Summery table, Contingency table, Bar plot, Pie chart, Frequency distribution, Relative frequency distribution, Cumulative frequency distribution, Histogram, Frequency polygon, Cumulative frequency graphs, Box plot, Time series plot, Scatter diagram.	**10**
Module – II Data Relationships, Transformation, and Data Cleaning: Relationships between different types of data: Relationship between two categorical data, Relationship between categorical and quantitative data, Relationship between two quantitative data Transformation: The logarithm transformation, Root and square root transformation Standardization (Z-transformation), Min-max normalization. Data cleaning: missing values, noisy data.	**10**
Module – III Analysis using Inferential Statistics: Sampling, Sampling Distribution, and Estimation of Parameters, Sampling distribution of: means, proportions, difference of means, difference of proportions. Hypothesis testing about: population mean, the difference between two means, about a population proportion, difference between two proportions.	**10**
Module – IV Social Network and Text Data Analysis: What is a social network? Characteristics of social network. Link mining: Tasks and challenges. Mining on social networks. Text data analysis and informational retrieval. Dimensional reduction for text.	**5**
Module – V Outlier Analysis: Outlier detection based on: statistical distribution, distance based, deviation based.	**5**

Text Books:

1. Gupta and Gupta, “Business Statistics”, Sultan Chand and Sons, 2014.
2. Bishnu and Bhattacherjee, Data Analysis: Using Statistics and Probability with R Language, PHI Learning, 2019.
3. Han J and Kamber M, “Data Mining: Concepts and techniques”, Morgan Kaufmann Publishers.

Reference Books:

1. Maheshwari Anil, “Data Analytics”, Mc Graw hill publication, 2017.
2. TanPang-Ning, SteinbachMichael, and KumarVipin, “Introduction to Data Mining, Pearson
3. Education”, New Delhi.Dunham H.M. & Sridhar S., “Data Mining”, Pearson Education, New Delhi, 2006.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Use of various data to implement all the data analysis concepts.
2. Interaction with domain knowledge concepts with the actual algorithmic implementation.
3. Handling real data using data analytics algorithms.

POs met through Gaps in the Syllabus

1, 3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. Data analysis using clustering
2. Panel data analysis, conjoint data analysis, logistic regression
3. Data analysis on domain specific data.

POs met through Topics beyond syllabus/Advanced topics/Design

1, 2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher’s Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students’ Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	1	3	3	1	3	1	1	1				2	2	2	3
CO2	3	2	3	1	3	3	1	1				2	3	2	2

CO3	1	3	3	3	3	1	2	2		1	1	2	2	2	2
CO4	3	2	2	1	3		1	1		1	1	2	2	3	2
CO5	1	3	3	3	3	1	1	1	1	1	1	2	2	3	2

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD Code	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD2, CD 4
CD2	Tutorials/Assignments	CO2	CD1 and CD4
CD3	Seminars	CO3	CD1, and CD8
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA274
Course Title: Data analytics using R Language Lab
Pre-requisite(s): Basic Programming
Co- requisite(s):
Credits: 2 L: 0 T: 0 P: 4
Class schedule per week: 04
Class: BCA
Semester / Level: PE III
Branch: BCA
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

30.	To know details about the R Language.
31.	Understand Applications, advantages and limitations of various data types.
32.	Real life use of data analytics using R Language.
33.	Doing projects on data analytics using R Language.
5.	Use R as a tool to develop latest know-how related to the subject.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Basic concepts of R programming.
CO2	Classify features of R programming and skills for various data analytic tool.
CO3	Apply the knowledge gained for their project work as well as to develop some statistical applications.
CO4	Implement R for various data analytics applications.
CO5	Devised R based projects on data analytics.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I 1. Mean, median, mode. 2. Harmonic mean, geometric mean. 3. Variance and standard deviation. 4. Quantiles, Percentile. 5. Skewness. 6. Moments. 7. kurtosis.	**8**
Module – II 8. Summery table, contingency table. 9. Frequency distribution, relative frequency distribution, cumulative frequency distribution. 10 Histogram, frequency polygon, cumulative frequency graphs, 11 Satter diagram. 12. Pie chart (2 D and 3 D) and bar plot (stacked and side by side). 13. Time series plot.	**8**
Module – III 14. Relationships between different types of data: Relationship between two categorical data. 15. Relationship between categorical and quantitative data. 16. Relationship between two quantitative data Transformation. 17. Logarithm transformation, Root and square root transformation. 18. Z-transformation 19. Min-max normalization.	**8**
Module – IV 20. Sampling distribution of: means. 21. Sampling distribution of: proportions. 22. Sampling distribution of: difference of means. 23. Sampling distribution of: difference of proportions.	**8**
Module – V 24. Hypothesis testing about: population mean. 25. Hypothesis testing about: the difference between two means. 26. Hypothesis testing about: a population proportion. 27. Hypothesis testing about: difference between two proportions. 28. Identification of outlier data using scatter plot and regression line. 29. Identification of outlier data using quartiles. 30. Identification of outlier data using box plot.	**8**

Text Books:

1. Jared P. Lander, R for Everyone: Advanced Analytics and Graphics, Addison-Wesley Professional, 2017.
2. Bishnu, Partha Sarathi, Bhattacherjee, Vandana, Data Analysis : Using Statistics and Probability with R Language, PHI Learning, 2019.

Reference Books:

1. Mark Gardener, Beginning R: The Statistical Programming Language, O'Reilly.
2. Hadley Wickham and , R for Data Science: Import, Tidy, Transform, Visualize, and Model Data, O'Reilly.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Use of massive data to implement all the data analytics concepts using R.
2. Interaction with domain knowledge with the actual algorithmic implementation using R language
3. Handling various data using same data analytics algorithms.

POs met through Gaps in the Syllabus

1, 3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. Implementation of Big data using R
2. Implementation of data mining using R
3. Implementation advanced graphical tools.

POs met through Topics beyond syllabus/Advanced topics/Design

1, 2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Day to day performance & Lab files	30
First Quiz	10
Viva	20
Examination Experiment Performance	30
Second Quiz	10

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

CO1	3	3	3	1	3	1	1	1				2	2	2	3
CO2	3	1	3	1	3	3	1	1				2	2	3	3
CO3	3	3	3	3	3	1	2	2		1	1	2	3	3	2
CO4	3	2	2	1	3		1	1		1	1	2	2	2	2
CO5	1	3	3	3	3	1	1	1	1	1	1	2	3	3	2

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD Code	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD2, CD 4
CD2	Tutorials/Assignments	CO2	CD1 and CD4
CD3	Seminars	CO3	CD1, and CD8
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

PROGRAM ELECTIVE III (PEI III)

Course Code: CA224
Course Title: CLOUD COMPUTING
Pre-requisite(s): Computer Network, Operating System
Co- requisite(s):
Credits: 4 L:3 T:1 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	To understand software, and other shared resources to be provisioned over the network as services in an on-demand manner.
B.	To understand the cloud computing models.
C.	To understand the different types of cloud computing services namely, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS).
D.	To understand virtualization, security and privacy issues.
E.	To understand Cloud OS, federated clouds.

Course Outcomes

After the completion of this course, students will be able to:

1.	Identify the current practices in cloud computing.
2.	Analyse the challenges in implementing clouds, data centers, hypervisor CPU and memory management
3.	Elaborate cloud hosted applications, and other advanced and research topics in cloud computing
4.	Evaluate the performance and systems issues, capacity planning, disaster recovery.
5.	Summarize the cloud computing facilities and current technologies.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Cloud Computing at a glance, Distributed Systems, Virtualization, Web 2.0,	**8**
Module – II Eras of Computing, Elements of Distributed Computing, Concepts of Virtualization and its characteristics, Virtualization and cloud computing, cloud reference model, types of clouds, economics of the cloud.	**8**
Module – III **Cloud Interoperability and standards:** **Amazon Web Services:** Compute Services, Storage Services, Communication Services. Google AppEngine: Architectural and Core Concepts, Application Life-Cycle, Cost Model. Microsoft Azure: Azure Core Concepts, SQL Azure.	**8**
Module – IV Energy-Efficiency in clouds, Energy-Efficient and Green Cloud Computing Architecture, Market- Oriented Cloud Computing, Federated clouds: characterization and definition, cloud federation stack. Cloud Security and Trust Management: Cloud Security Defense Strategies.	**8**
Module – V Application of clouds in: Health care, Biology, CRM, ERP, Social Networking, Productivity and Geoscience. Cloudlets for Mobile Cloud Computing.	**8**

TEXT BOOK

1. BuyyaRajkumar, Charles, VecchiolaChristian amd SelviS. Thamarai "Mastering Cloud Computing", McGraw Hill Education(India) Private Limited, 2013.

REFERENCE BOOK

1. HwangKai, FoxGeoffrey C., DongarraJack J., "Distributed and Cloud Computing from Parallel Processing to the Internet of Things", Morgan Kaufmann - India Edition, 2012.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA275

Course Title: ANDROID PROGRAMMING
Pre-requisite(s):
Co- requisite(s): Computer Network, Operating System
Credits: 4 L:3 T:1 P:0
Class schedule per week: 04
Class: BCA
Semester / Level: V/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	Develop app for digital devices.
2.	Learn real time app.
3.	Apply skill on real time applications.
4.	Understand the logic and challenges of Android programming.
5.	Integrate Java and android to develop game and applications for different industries.

Course Outcomes

After the completion of this course, students will be able to:

1.	Define app requirements for digital devices.
2.	Classify the constraints in developing real time app.
3.	Apply skill on real time applications.
4.	Evaluate the logic and challenges of Android programming.
5.	Develop and Integrate Java and android to develop game and applications for different industries.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I What is Android? Android EcoSystem, Features of Android, Architecture of Android, Android Verson,Android SDK, Android Development tools, Anatomy of an Android Application.	**8**
Module – II **Android User Interface**: Linear Layout, Absolute Layout, Frame Layout, Relative Layout, Table Layout.	**8**
Module – III **Designing User Interface with View**: Text View, Push Button, Image Button, Edit Text, Checkbox, ToggleButton, Radio Button, ProgressBar, Spinner, List View, Gridview, Time and Date Picker.	**8**
Module – IV **Displaying Pictures and Menus with Views**: Gallery Views,ImageSwitcher, GridView, Options Menu, Context Menu, DigitalClock View, Webview. **SMS Messaging**: Sending SMS Messages Programmatically.	**8**
Module – V **SQLITE Database in Android**: SQLite Database, Creation and connection of the database, extracting values from a curser.	**8**

TEXT BOOK

1. DixitPrashant Kumar, "Android", Vikas Publishing House Pvt. Ltd, 1st Edition, 2014.

REFERENCE BOOK

1. LeeWei-Meng, "Beginning Android for Application Development", Wiley, Indian Edition.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Not interfacing with remote cloud storage
2. Not interfacing with computing Fog layer

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9

CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course code: CA 276

Course title: Android Programming Lab
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L: 0 T: 0 P: 4
Class schedule per week: 04
Class: BCA Semester / Level: IV/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students to:

1	Develop app for Android Based Mobile.
2	Understand the pros and cons of Android programming.
3	Understanding different App development platforms.
4	Learn the concept of real time app development.
5	Integrate different types of files and android to develop applications for different industries.

Course Outcomes

After the completion of this course, students will be able to:

1	Develop app for different android based devices.
2	Understand constraints to develop apps on android platform.
3	Develop real time applications.
4.	Integrate different types of files with Android.
5.	Develop database application on Android platform.

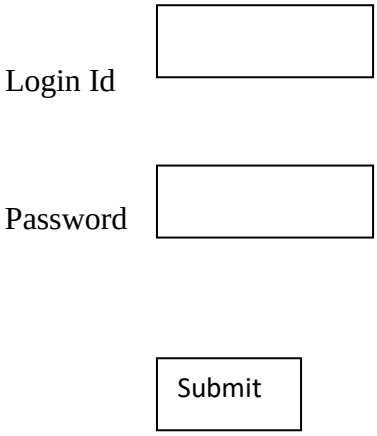
SYLLABUS

List of Programs as Assignments:

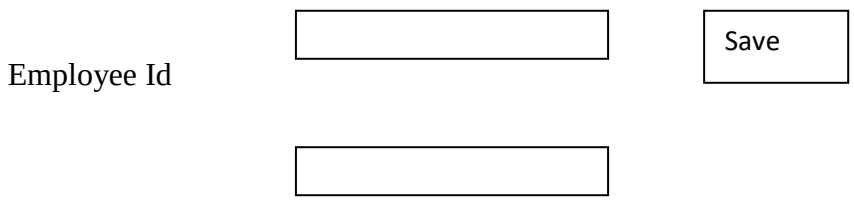
1. Write a program using Android Developer Studio/Eclipse to generate Frame Layout.
2. Write a program using Android Developer Studio/Eclipse to generate button with content “My Button”.
3. Write a program using Android Developer Studio/Eclipse to generate three buttons with content “First”, “Second”, “Third” and then orient them along row wise.

4. Write a program using Android Developer Studio/Eclipse to generate three buttons with content “First”, “Second”, “Third” and then orient them along column wise.
5. Write a program using Android Developer Studio/Eclipse to create Text-View to accept user name.
6. Write a program using Android Developer Studio/Eclipse to generate the following Table Layout

7. Write a program using Android Developer Studio/Eclipse to generate the following Table Layout



8. Write a program using Android Developer Studio/Eclipse to implement Check_box.
9. Write a program using Android Developer Studio/Eclipse to implement Radio_Button.
10. Write a program using Android Developer Studio/Eclipse to import image to Frame Layout.
11. Write a program using Android Developer Studio/Eclipse to display an option Menu.
12. Write a program using Android Developer Studio/Eclipse to generate Analog Clock.
13. Write a program using Android Developer Studio/Eclipse to generate Digital Clock
14. Write a program using Android Developer Studio/Eclipse to load URL “google.com”.
15. Write a program using Android Developer Studio/Eclipse to load URL “bitmesra.ac.in”
16. Write a program using Android Developer Studio/Eclipse to accept a mobile number and then send sms “Welcome”.
17. Write a program using Android Developer Studio/Eclipse to implement Context Menu.
18. Write a program using Android Developer Studio/Eclipse to display current date.
19. Create a SQLITE database Employee and Make a form in Android Studio/Eclipse to allow data entry to Employee Form with the following command buttons:



Employee Name

Cancel

Address

Date of Joining

20. Create a SQLITE database Student and Make a form in Android Studio/Eclipse to allow data entry to Student Form with the following command buttons:

Submit

Roll No

Name

Cancel

Text Books:

1. DixitPrashant Kumar, "Android", Vikas Publishing House Pvt. Ltd, 1 st Edition,2014.

Reference Books:

Programming Android, 2nd Edition, Zigurd Mednieks, Blake Meike, Laird Dornin, Masumi Nakamura,

O'Reilly Media, October 2012

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 5

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20

Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course code: CA277
Course title: Python Programming
Pre-requisite(s): Nil
Co- requisite(s): CA 278 Python Programming Lab
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: BCA

Course Objectives
This course enables the students to:

A.	Understand computer programming concept using python language
B.	Explore basic data types, control structures and standard library functions.
C.	Explore the basic data structures: List, Tuple, Sets, Dictionaries available in python
D	Learning Object oriented concept of programming and its implementation in python.
E.	Handle disk data file for input output operations.

Course Outcomes
After the completion of this course, students will be able to:

CO1	Solve the basic mathematical problem using python programming
CO2	Use basic data types control structures and utility functions from standard library for faster programming.
CO3	Use the basic and user defined data structures as per the need of problem.
CO4	Design and implement the problem using OOP concept of python.
CO5	Store, retrieve and manipulate data with disk file.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Introduction to Computers, Programs, and Python:** Introduction,Programming Languages, Operating Systems, The History of Python, Features of python language, Getting Started with Python, Programming Style and Documentation, Programming Errors. **Elementary Programming:** Introduction, Writing a Simple Program, Reading Input from the Console, Identifiers,Variables, Assignment Statements, and Expressions, Simultaneous Assignments, Named Constants, Numeric Data Types and Operators, Evaluating Expressions and Operator Precedence, Augmented Assignment Operators, Type Conversions and Rounding.	**8**
Module – II **Mathematical Functions, Strings,and Objects**: Introduction, Common Python Functions, Strings and Characters, Introduction to Objects and Methods, Formatting Numbers and Strings. **Control Structures: Selections:** Introduction, Boolean Types, Values, and Expressions,**if** Statements, Two-Way **if-else** Statements, Nested **if** and Multi-Way **if-elif-else** Statements**,** Logical Operators, Conditional Expressions, **Loops**: Introduction, The **while** Loop, The **for** Loop, Nested Loops,Keywords **break** and **continue**	**8**
Module – III **Functions:** Introduction, Defining a Function, Calling a Function, Functions with/without Return Values, Positional and Keyword Arguments, Passing Arguments by Reference Values, Modularizing code, The Scope of Variables, Default Arguments, Returning Multiple Values. **Lists:** Introduction, List Basics, Copying Lists, Passing Lists to Functions, Returning a List from a Function, Searching Lists, Sorting, Processing Two-Dimensional Lists, Passing Two-Dimensional Lists to Functions, Multidimensional Lists.	**8**

Module – IV **Tuples, Sets, and Dictionaries:** Introduction, Tuples: Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Tuple methods, Sets: Creating Sets, Manipulating and Accessing Sets, Subset and Superset, Set Operations, Comparing the Performance of Sets and Lists, Dictionaries: Creating a Dictionary, Adding, Modifying, and Retrieving Values, Deleting Items, Looping Items, The Dictionary Methods. .	**8**
Module – V **Objects and Classes:** Introduction, Defining Classes for Objects, Immutable Objects vs. Mutable Objects, Hiding Data Fields, Class Abstraction and Encapsulation, Object-Oriented Thinking.Inheritance and Polymorphism: Introduction, Superclasses and Subclasses, Overriding Methods, The **object** Class, Polymorphism and Dynamic Binding, The **isinstance**Function. Class Relationships: Association, Aggregation, composition. **Files and Exception Handling:**Introduction, text input and ouput: opening a file, Writing Data, Testing a File's Existence, Reading All Data from a File, Writing and Reading Numeric Data, Binary IO Using Pickling, Exception Handling, Raising Exceptions.	**8**

TEXT BOOK

1. Y. Daniel Liang, "Introduction to programming using python", Pearson Education; First edition (2017).

REFERENCE BOOK

1. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education; Forth edition (2018)
2. Mark Lutz, "Learning Python" O′Reilly Fifth edition (2013)
3. Mark Summerfield, "Programming in Python 3: A Complete Introduction to the Python Language" Pearson Education; Second edition (2018)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8

CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course code: CA 278
Course title: Python Programming Lab.
Pre-requisite(s): No
Co- requisite(s): CA277 Python Programming.
Credits: 2 L: 0 T: 0 P: 4
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: BCA

Name of Teacher:

Course Objectives
This course enables the students to:

1.	Understand computer programming concept using python language
2.	Explore basic data types, control structures and standrard library functions.
3.	Explore the basic data structures: List, Tuple, Sets, Dictionaries available in python
4.	Learning Object oriented concept of programming and its implementation in python.
5.	Handle disk data file for input output operations.

Course Outcomes
After the completion of this course, students will be able:

CO1	Solve the basic mathematical problem using python programming
CO2	Use basic data types control structures and utility functions from standard library for faster programming.
CO3	Use the basic and user defined data structures as per the need of problem.
CO4	Design and implement the problem using OOP concept of python.
CO5	Store, retrieve and manipulate data with disk file.

SYLLABUS

List of Programs as Assignments:

1. Write a program that displays "Hello to Python programming".

2. Write a program to read two integers and perform arithmetic operations on them (addition, subtraction, multiplication and division).

3. Write a program to read the marks of three subjects and find the average of them.

4. Surface area of a prism can be calculated if the lengths of the three sides are known. Write a program that takes the sides as input (read it as integer) and prints the surface area of the prism (Surface Area = 2ab + 2bc + 2ca)

5. A plane travels 395,000 meters in 9000 seconds. Write a program to find the speed of the plane (Speed = Distance / Time).

6. You need to empty out the rectangular swimming pool which is 12 meters long, 7 meters wide and 2 meter depth. You have a pump which can move 17 cubic meters of water in an hour. Write a program to find how long it will take to empty your pool? (Volume = l * w * h, and flow = volume/time).

7. Write a program to convert temperature from centigrade (read it as float value) to Fahrenheit.

8. A car starts from a stoplight and is traveling with a velocity of 10 m/sec east in 20 seconds. Write a program to find the acceleration of the car. [acc = $(V_{final} - V_{initial})$/ Time].

9. Write a Program to Prompt for a Score between 0.0 and 1.0. If the Score Is Out of Range, Print an Error. If the Score Is between 0.0 and 1.0, Print a Grade Using the Following Table

Score	Grade
>= 0.9	A
>= 0.8	B
>= 0.7	C
>= 0.6	D
< 0.6	F

10. Write a Program to find the maximum of three numbers.

11. Suppose you want to develop a program to play a lottery. The program randomly generates a two-digit number, prompts the user to enter a two-digit number, and determines whether the user wins according to the following rules:
    a) If the user's input matches the lottery in the exact order, the award is $10,000.
    b) If all the digits in the user's input match all the digits in the lottery number, the award is $3,000.
    c) If one digit in the user's input matches a digit in the lottery number, the award is $1,000.

12. Write a Program to Check If a Given Year Is a Leap Year.

13. Program to Find the GCD of Two Positive Numbers.

14. Write a program that prompts the user to enter a four-digit integer and displays the number in reverse order.

15. Write Python Program to Find the Sum of Digits in a Number

16. Write a program to print the sum of the following series.
    a) $1 + 1/2 + 1/3 +. \ldots. + 1/n$
    b) $1/1 + 2^2/2 + 3^3/3 + \ldots\ldots. + n^n/n$

17. Write a Program to Display the Fibonacci Sequences up to nth Term Where n is Provided by the User.

18. Write a Program to Find the Sum of All Odd and Even Numbers up to a Number Specified by the User.

19. Write a Program to Check Whether a Number Is Prime or Not.

20. Write a Program to Find the Factorial of a Number.

21. Write a Program to Demonstrate the Return of Multiple Values from a Function Definition.

22. Program to Demonstrate the Use of Default Parameters

23. Write Program to Demonstrate the Scope of Variables.

24. Program to Print the Characters Which Are Common in Two Strings.

25. Write a program to check whether a given String is palindrome or not.

26. Write Python Program to Count the Number of Times an Item appears in the List.

27. Write a program to create a list of integer numbers. Sort the elements using any sorting method.

28. Write a program to create a lists of integer numbers and perform the linear and binary search.

29. Write a program to create a lists of cities names and perform the sort the cities name in alphabetical order.

30. Find Mean, Variance and Standard Deviation of List Numbers

31. Write a Program to Find the Transpose of a Matrix.

32. Write a program to perform the matrices multiplication.

33. Write a program to create a dictionary for countries name as key and currency as value. Traversve the dictionary with key:value Pairs in using for Loop.

34. Write a program to create tuples, and perform the following operations: Merging of tuples, Spliting of a tuple, comparison of two tuples.

35. Write a program to create an intersection, union, set difference, and symmetric difference of sets.

36. Write a program with "MyRectangle" class aving the dimensions as data members and area() as a method member. Calculate the area of each rectangle object created by user.

37. Design a class with name "MyComplex" to represent the complex number including the constructor overloading, methods to perform the arithmetic operation over the two complex numbers. Write the complete python program for the above design.

38. Design a class with name "Distance" to represent the distance in feet and inch. Include the method to calculate the addition of two distances. Write the complete python program for the above design.

39. Write a complete program to implement the Employee and its subclasses (Salarayed Employee, DailyWaged Employee, Commission based employee) given in Hierarchical and multilevel manner. The program should exhibit the use of super key word to invoke the super class constructor.

40. Write a program to open a file and perform the reading and writing operation with the file.

41. Write a program to count the number of line in a file.

42. Write a program to count the frequencies of each word from a file.

43. Write a program to copy the text of a file to another file.

44. Write a program to append a file with the content of another file.

45. Write a program to compare two file.

46. Write a program to delete and insert a sentence at specified position in a file.

47. Write a program to delete a sentence from a file if the file contains a specific word.

48. Write program to delete comment lines from a file.

49. Write a program to capitalize each word of the file.

50. Write a program to handle an exception using exception handling mechanism of the python.

51. Write a program to raise an exception explicitly using raise keyword.

Text Books:

1. Y. Daniel Liang, "Introduction to programming using python", Pearson Education; First edition (2017).

Reference Books :

1. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education; Forth edition (2018)

2. Mark Lutz, "Learning Python" O′Reilly Fifth edition (2013)
3. Mark Summerfield, "Programming in Python 3: A Complete Introduction to the Python Language" Pearson Education; Second edition (2018)

Gaps in the Syllabus (to meet Industry/Profession requirements)
POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

PROGRAM ELECTIVE IV (PEI IV)

Course Code: CA320
Course Title: Software Testing
Pre-requisite(s):
Co- requisite(s): Computer Network, Operating System
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

Course Objectives

This course envisions to impart to students to:

34.	Have a broad understanding of software requirements in context to end user expectations
35.	Familiarize with testing environments and test processes.
36.	Describe to the students the impact and methods to overcome programming errors
37.	Devise strategies to detect and rectify common programming errors.
38.	Conceptualize the role of testing in estimating software quality.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Understand the types and effects of errors and bugs on a software and the testing process
CO2	Apply testing strategies to detect software bugs.
CO3	Analyse approaches of verification and validation including static analysis, and reviews as well as software testing approaches such as unit testing and integration testing.
CO4	Evaluate the software quality and apply test suites like JUnit and selenium for testing software.
CO5	Summarize best practices for coding to ensure good quality software, quality products by applying quality metrics.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Introduction:Software Testing – Psychology of Testing, Verification and Validation, Testing Team and Development Team, Characteristics of Test Engineers, Levels of Testing Principles of Software Testing, Error, Fault, Failure, Incident, Error and Fault Taxonomies, Test Cases, Limitations of Testing Codeinspections, desk checking, group walkthroughs and peer reviews. Overview of Graph Theory for tester.	**8**
Module – II Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision TableBased Testing, Cause Effect Graphing Technique. Structural Testing: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, DataFlow Testing, Slice based testing	**8**
Module – III Testing Activities: Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Regression Testing, Extreme Testing.	**8**
Module – IV Object Oriented Testing: Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing. Testing Internet applications: Overview, challenges and strategies of testing internet applications.	**8**
Module – V Overview of Testing Tools – Need for Automated Testing Tools, Taxonomy of Testing Tools, Functional/Regression Testing Tools, Performance Testing Tools, Testing Management Tools, Source Code Testing Tools, How to select a Testing Tool. WinRunner – Overview of WinRunner, Testing Applications using WinRunner	**8**

Text Books:

1. JorgensenPaul C., "Software Testing- A Craftsman's Approach", Second Edition, CRC Press, 2008.
2. Ammann Paul and OffuttJeff, "Introduction to Software Testing", Cambridge University Press, Cambridge, UK, ISBN 0-52188-038-1, 2008.

Reference Books:

1. TamresLouise, "Software Testing", Pearson Education Asia, 2002.
2. PressmanRoger S., "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
3. AggarwalK.K. & SinghYogesh, "Software Engineering", New Age International Publishers, New Delhi, 2003 4. TamresLauise, "Introducing Software Testing", Pearson Education

Gaps in the Syllabus (to meet Industry/Profession requirements)

13. Machine Learning in Testing
14. Big Data Testing.
15. Combining Manual and Automated Testing.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

8. Test Automation.
9. Shortening Delivery Cycle
10. Digital Transformation with Agile.
11. Increasing Adoption of DevOps

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1				2	3	2	3
CO2	3	3	3	1	3	1	1	1				2	2	3	2
CO3	3	3	3	3	3	1	2	2		1	1	2	3	2	3
CO4	3	3	3	1	3		1	1		1	1	2	3	3	2
CO5	3	3	3	3	3	1	1	1	1	1	1	2	2	3	2

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD7, CD 8
CD2	Tutorials/Assignments	CO2	CD1 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD3
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA321
Course Title: SOFTWARE TESTING LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A.	Have a broad understanding of software requirements in context to end user expectations.
B.	Familiarize with testing environments and test processes.
C.	Describe to the students the impact and methods to overcome programming errors
D.	Devise strategies to detect and rectify common programming errors.
E.	Conceptualize the role of testing in estimating software quality.

Course Outcomes

After the completion of this course, students will be able to:

1.	Understand the types and effects of errors and bugs on a software and the testing process.
2.	Apply testing strategies to detect software bugs.
3.	Analyse approaches of verification and validation including static analysis, and reviews as well as software testing approaches such as unit testing and integration testing.
4.	Evaluate the software quality and apply test suites like JUnit and selenium for testing software.
5.	Summarize best practices for coding to ensure good quality software, quality products by applying quality metrics

SYLLABUS

List of Programs as Assignments:

1. Why testing is required?
2. What are the types of testing?
3. What is difference between Verification and Validation?
4. Explain Principles of Software Testing.
5. What are Test Cases?
6. Overview of Graph Theory for tester.
7. Explain Boundary Value Analysis with example.
8. Explain Equivalence Class Testing with example.
9. Explain Decision Table Based Testing with example.
10. Explain Cause Effect Graphing Technique with example.
11. Explain Path testing with example.
12. Explain Cyclomatic Complexity with example.
13. What are Graph Metrics?
14. Explain Dataflow Testing with example.
15. Explain Slice based testing with example.
16. What are Testing Activities?
17. What are Levels of Testing?
18. Explain Integration Testing.
19. What is System Testing?
20. What is Regression Testing?
21. What is Extreme Testing?
22. What is Debugging?
23. Discuss the challenges and strategies of testing internet applications
24. What do you understand the Automation Testing Approach ?
25. Write and test a program to login a specific web page
26. Write and test a program to update 10 student records into table into Excel file
27. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects).
28. Write and test a program to provide total number of objects present / available on the page.
29. Write and test a program to get the number of list items in a list / combo box.
30. Write and test a program to count number of items present on a desktop
31. Give an overview of WinRunner, Note down the Testing Applications using WinRunner.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9

CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA322
Course Title: NETWORK SECURITY
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	Able to understand the fundamentals of security algorithms currently
2.	Able to understand E-mail security, PEM& S/MIME, PGP, Firewalls.
3.	Have a broad knowledge of the state-of-the-art and open problems in network security
4.	Enhance their potential to do research or pursue a career in this rapidly developing area.
5.	Able to be introduced to new developing security features.

Course Outcomes

After the completion of this course, students will be able to:

1.	Identify state-of-the-art and open problems in network security
2.	Analyse all relevant aspects of security in networks like E-mail security, PEM& S/MIME, PGP, Firewalls.
3.	Assess the impact of Modes of Operation and problems in network
4.	Summarise developing security features in networking systems and Real time communication security
5.	Design of secure system and applications

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Introduction to networking: OSI Reference model, Active vs Passive attacks, Layers and cryptography, Multilevel model of security.	**8**
Module – II Modes of Operation: encrypting large messages, Generating MAC's, Multiple Encryption DES, Hash and message digest: Using Hash for encrypting, MD2, MD4, MD5, SHA1.	**8**
Module – III Authentication Systems, Password authentication systems, authentication protocols, tructed intermediates, session key establishment. Security handshake pitfalls: mutual authentication, Integrity / encryption of data, mediated authentication, strong password protocols.	**8**
Module – IV Real time communication security: Session key establishment, perfect forward secrecy, DOS, clogging protection, Arranging for parallel computation, session resumption, data steam protection, plausible deniability.	**8**
Module – V E mail security, PEM& S/MIME, PGP, Firewalls.	**8**

TEXT BOOK

1. Kaufman Charlie, Perlman Radia and Speciner Mike, "Network Security: Private Communication in a Public World", 2nd Edition, Prentice Hall, 2002.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Student Feedback on Faculty

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

PROGRAM ELECTIVE V

Course Code: CA323
Course Title: CYBER FORENSICS
Pre-requisite(s):
Co- requisite(s):
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

39.	Provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
40.	Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes
41.	Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools.
42.	E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Understand relevant legislation and codes of ethics.
CO2	Apply Computer forensics and digital detective and various processes, policies and procedures.
CO3	Understand E-discovery, guidelines and standards, E-evidence, tools and environment.
CO4	Learn the techniques of Email and web forensics and network forensics tools.
CO5	Integrate techniques to recover data from computer and hand held devices.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I IPsec protocols - IP Authentication header - IP ESP, Key management protocol for IPsec, Transport layer Security: SSL protocol, Cryptography computations - TLS protocol	**8**
Module – II PGP - S/ MIME: Internet Firewalls for Trusted System: Roles of Firewalls - firewall related terminology, Types of Firewalls, Firewall design, Honeycomb design: Set for E-Commerce transactions	**8**
Module – III Introduction to traditional cybercrime, Traditional problems associated with cybercrime, Introduction to Identity Theft & Identity Fraud, Types of Cyber Forensics techniques: incident & incident response methodology, Forensics duplication & investigations, Preparation of IR: Creating response tool kit & IR team, Forensics Technology & Systems	**8**
Module – IV Processing Crime & Incident Scenes, Working with windows & DOS systems, Current computer Forensics tools: Software/ hardware tools	**8**
Module – V Validating Forensics data, Data hiding techniques, Performing Remote Acquisition, Network Forensics, Email investigations, Cell phone & Mobile devices Forensics	**8**

Text Books:

1. Albert J. Marcella Jr., & Frederic Guillossou, “Cyber Forensics: From Data to Digital Evidence”, John Wiley and Sons, ISBN-13: 978-1118273661, 2012.

Gaps in the Syllabus (to meet Industry/Profession requirements)

NIL

POs met through Gaps in the Syllabus

N. A.

Topics beyond syllabus/Advanced topics/Design

NIL

POs met through Topics beyond syllabus/Advanced topics/Design

N. A.

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	2		3	2	3	3	3
CO2	3	1	1	1	1	3	1	1	2	1	3	2	3	3	3
CO3	2	3	3	1	2	1	2	2	2		3	3	3	3	3
CO4	1	1	3	3	1	1	1	1	2	1	2	1	3	2	3
CO5	3	3	3	1	2	1	1	2	2		1		3	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD Code	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD 8
CD2	Tutorials/Assignments	CO2	CD1, CD8, CD9
CD3	Seminars	CO3	CD1, CD2, CD3, CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8, CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2, CD3, CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course code: CA325
Course title: UNIX AND SHELL PROGRAMMING
Pre-requisite(s):
Co- requisite(s):
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives:

This course enables the students:

A.	To understand concept of an Operating System.
	Understand Applications and Features on Unix/Linux.
	Understand the process in Linux.
	Using shell as a programming language.
	At Working with System Calls and Interrupts.

Course Outcomes

After the completion of this course, students will be able to:

CO 1.	Understanding the design of Linux kernel components
CO 2.	Experiencing the kernel by passive/active observation
CO 3.	Extending the Linux kernel for understanding, self-satisfaction/falsification.
CO 4.	Exploring current research trends in OS, Linux being the reference OS
CO 5.	Understanding the design of Linux kernel components

SYLLABUS

MODULE	**(NO. OF LECTURE HOURS)**

Module I : **Introduction to Unix**: Introduction to operating system, Introduction to Unix, Application of Unix, History of Unix, Features of Unix, Typical Unix Based systems, Login and Logout procedure, Introductory commands date, cal, banner, writer, mesg, who, passwd. **Files and Directories:**Unix Architecture, kernel, shell, Utilities, Unix file system, Unix files, type of files,File naming conventions. Unix Directories, Basic commands for working with Directories pwd,mkdir,cd, ls, Metacharacters and wildcard, rmdir. **File Manipulations:**File security and Ownership issues, Type of access to files / directories, Determining file access permission, changing the access chmod, chown,chgrp, File management utilities of Unix	8
Module II : **Input Output Redirection and Filters:**Input/output redirection in UNIX, Input redirection, Output redirection, standard error redirection. Pipes and Filters. Working with Vim Editor. **Introduction to Processes**: Processes in Unix, Manipulation of processes, Running processes in the background, Terminating processes.	8
Module III : **Shell Programming - i**: Features of the shell, shell as a Programming Language, Creating and executing a shell script, shell variables, Command substitution, Local and Global variables, Conditional execution Operators. **Shell Programming – ii**: Iteration construct, The case… esacConstruct.Parameters to shell scripts. Shifting the parameters, Listing the shell variables, Creating User define functions.	8
Module IV : **Positioning the Cursor:**tput, Interrupt handling. The awk Utility: The awk Utility, The awk program structure, Processing Records, Logical Operators, Special Patterns, Action statements, Print statements. Control flow statements, String and numberic functions in awk. System calls for Low Level Input / Output. File descriptor, File I: Open, read, write and close.	8
Module V : **File Creation: Create, Random access:**Iseek, Change directoy: chdir, Determining and changing file access, access system call, chmod system call, chown system call. **Status of files:**stat, fstat. Linking and unlinking files: link, unlink. System calls for process management: Introduction, Context of a process, Execution of Processes: exec	8

TEXT BOOK

1. MichaelRandal K., “Mastering Unix Shell Scripting”, 2nd Edition, Wiley publication.

REFERENCE BOOK

1. VenkateshmurthyM.G., "Introduction to Unix and Shell Programming", Paperback, Pearson. 2005.
2. COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Advanced level of shell scripting and shell programming should be introduced.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. Advanced design level questions solving skills by lab work should be incorporated.
2. Kernel compilation may be introduced.

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment –

1. Student Feedback on Faculty

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2

CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course code: CA326
Course title: Unix and Shell Programming Lab
Pre-requisite(s): C/C++; Knowledge of programming languages
Co- requisite(s): OS Lab
Credits: 2 L:0 T:0 P: 4
Class schedule per week: 04
Class: Bachelor of Computer Applications
Semester / Level: II/1
Branch: BCA
Course Objectives
This course enables the students:

Course Objectives
This course enables the students:

A.	To understand the basic concepts of UNIX & shell programming
B.	To understand the structure of a file system.
C.	To explore the function of a kernel.
D.	Use a UNIX text editor to create a shell script and run scripts effectively from the command

	line

Course Outcomes

After the completion of this course, students will be able to:

1.	Will be able to describe and use the UNIX operating system.
2.	Will be able to describe and use the fundamental UNIX system tools and utilities.
3.	We will able to describe and write shell scripts in order to perform basic shell programming.
4.	Will be able to describe and understand the UNIX file system

SYLLABUS

1. Write a shell script to check if the number entered at the command line is prime or not.

2. Write a shell script to modify "cal" command to display calendars of the specified months.

3. Write a shell script to modify "cal" command to display calendars of the specified range of months.

4. Write a shell script to accept a login name. If not a valid login name display message "Entered login name is invalid".

5. Write a shell script to display date in the mm/dd/yy format.

6. Write a shell script to display on the screen sorted output of "who" command along with the total number of users.

7. Write a shell script to display the multiplication table of any number.

8. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.

9. Write a shell script to find the sum of digits of a given number.

10. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.

11. Write a shell script to find the LCD(least common divisor) of two numbers.

12. Write a shell script to perform the tasks of basic calculator.

13. Write a shell script to find the power of a given number.

14. Write a shell script to find the greatest number among the three numbers.

15. Write a shell script to find the factorial of a given number.

16. Write a shell script to check whether the number is Armstrong or not.

TEXT BOOK

1. MichaelRandal K., "Mastering Unix Shell Scripting", 2nd Edition, Wiley publication.

REFERENCE BOOK

1. VenkateshmurthyM.G., "Introduction to Unix and Shell Programming", Paperback, Pearson. 2005.
2. COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Incorporation of advance level of shell scripting and shell programming may be done to meet industry requirement.

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. Advanced design level questions solving skills by lab work should be incorporated.
2. Kernel compilation may be introduced.

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1, CD5, CD8and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

PROGRAM ELECTIVE VI

Course Code: CA327
Course Title: System Programming
Pre-requisite(s):
Co- requisite(s): None
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

43.	Describe the utility of different system programs & system tools.
44.	Familiarize with the trade-offs between run-time and compile-time processing (Linking & Loading techniques).
45.	To learn the concepts and techniques behind the designing of various system software.
46.	To organize the functionalities & components of system software & tools into different layers for efficient code generation.
47.	Understand the designing of text editors, debuggers etc.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Elaborate the evolution of various system software.
CO2	Define various data structures that helps in the proper functioning of the system programs.
CO3	Analyse basic design of various system software.
CO4	Apply functionalities & components of system software & tools into different layers for efficient code generation.
CO5	Development and designing of text editors, debuggers etc.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Introduction:** Evolution of the Components of a Programming System, Assemblers, Loaders, Macros, Compilers, Linkers, Overview of Machine Language.	**8**
Module – II **Instruction Addressing and Execution:** Evolution of Operating Systems, Features of an Operating System, The BIOS Boot Process, The System Program Loader, Stack, Instruction Execution and Addressing, Instruction operands, protected Mode.	**8**
Module – III **Assemblers:** Overview of Assembly Language, Assembly Language Features, Conventional Segment Directives, Assembly Process, Single Pass Assembler, Design of a 2-Pass assembler for 8088.	**8**
Module – IV **Macros & Macro Processors:** Macros, Different forms of Macros, Macros using AIF, AGO, REPT. Etc., Design of a Macro Processor, Macro Assembler. Loaders: Basic Loader Functions, Absolute Loader, Compile & go Loader, Relocating Loader, Direct Linking Loader.	**8**
Module – V **Linkage Editors:** Linking and Relocation, Program Relocatability, Linkage Editor and its Application in IBP-PC, Linking for Program Overlays. Software Tools: Spectrum of Software Tools, Text Editors, Interpreter and Program Generators, Debug Monitors, Programming Environments.	**8**

Text Books:
1. DhamdhereD.M., "System Programming and Operating Systems", 2nd Edition., TMH, New Delhi.

Reference Books:
1. AbelPeter, "IBM PC Assembly Language and Programming", 5th Edition, PHI, New Delhi-2003.
2. 2. DonovanJ.J., "System Programming", TMH, New Delhi.

Gaps in the Syllabus (to meet Industry/Profession requirements)
1. Application of macros in Language processing system .
2. Application of text editors.

POs met through Gaps in the Syllabus
3, 5

Topics beyond syllabus/Advanced topics/Design
1. Algorithm for Single Pass Assembler and 2-Pass assembler.
2. Utility of system software for efficient code generation.

POs met through Topics beyond syllabus/Advanced topics/Design
2, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)	Program Specific Outcomes

													(PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	3	2	2	3	3
CO2	3	1	1	1	1	3	1	1	1	2	1	1	2	3	1
CO3	2	3	3	1	2	1	2	2	2	1	3	1	3	2	2
CO4	1	1	3	3	1	1	1	1	1	1	2	2	3	1	2
CO5	3	3	3	1	2	1	1	2	1	2	1	1	2	3	1

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD8and CD9
CD3	Seminars	CO3	CD1, CD2 and CD5
CD4	Mini Projects/Projects	CO4	CD1 CD5, CD8 and CD9
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course code: CA328
Course title: DISTRIBUTED DATABASE SYSTEMS
Pre-requisite(s):
Co- requisite(s): None
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives

This course enables the students to:

1.	Introduce principles and foundations of distributed databases
2.	Learn concepts related to architecture, design issues, integrity control, query processing
3	Understand the concept of a database transaction and related database facilities, including concurrency control, backup and recovery
4.	How to interpret the modeling symbols for the most popular ER modeling tools. And real-world database design which often involves conflicting goals.
5.	Know the role of the database administrator and data object locking and protocols in distributed databases

Course Outcomes

After the completion of this course, students will be able to:

1.	Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
2.	Design and implement a small distributed database project
3	Interpret the modeling symbols for the most popular ER modeling tools in context to real-world database design which often involves conflicting goals.
4.	Describe and discuss selected advanced database topics like the data warehouse.
5.	Apply optimization, transactions, and concurrency control in distributed environment.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module I: **Introduction:** Distributed Data Processing, What is a Distributed Database System? Promises of DDBSs, Problem Areas.	**8**
Module II: **Distributed DBMS Architecture:** DBMS Standardization, Architectural Models for Distributed DBMSs, Distributed DBMS Architecture. **Distributed Database Design:** Alternative Design Strategies, Distribution Design Issues, Fragmentation, Allocation.	**8**
Module III: **Overview of Query Processing:** Query Processing Problem, Objectives of Query Processing, Complexity of Relational Algebra Operations, Layers of Query Processing. **Query Decomposition and Optimization:** Query Decomposition, Query Optimization, Centralized Query Optimization, Distributed Query Optimization Algorithms.	**8**
Module IV: **Transaction Management and Concurrency Control:** Definition of a Transaction, properties of Transactions, Serializability Theory, Taxonomy of Concurrency Control Mechanisms, Locking-based Concurrency Control Algorithms, Timestamp-based Concurrency Control Algorithms, Deadlock Management.	**8**
Module V: **Distributed DBMS Reliability:** Reliability Concepts and Measures, Failures and Fault Tolerance in Distributed Systems, Failures in Distributed DBMS, Local Reliability Protocols, Distributed Reliability Protocols.	**8**

TEXT BOOK

1. OzsuM. Tamer, ValduriezPatrick, “Distributed Database Systems”, 2nd Edition, Pearson, 2011.

REFERENCE BOOKS

1. NavatheElmasri, “Fundamental of Database Systems”, 5th Edition, Pearson Education, 2008.
2. ConnollyThomas, BeggCarolyn, “Database Systems – A Practical Approach to Design, implementation and Management”, 4th Edition, Pearson Education, 2008.
3. Silberschatz, Korth, &Sudarshan, “Database System Concepts”, 4th Edition, McGraw Hill, 2002.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Network topology
2. Communication Schemes
3. Semantic Data Control
4. Join Ordering in fragments

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. Parallel Database System
2. Distributed Object DBMS
3. Data delivery alternatives

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher’s Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students’ Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	1	3	1	1	1				2	2	3	1
CO2	3	3	3	1	3	1	1	1				2	3	2	2
CO3	3	3	3	3	3	1	2	2		1	1	2	3	2	2
CO4	3	3	3	1	3		1	1		1	1	2	3	2	1
CO5	3	3	3	3	3	1	1	1	1	1	1	2	2	3	2

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD Code	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD7, CD 8
CD2	Tutorials/Assignments	CO2	CD1 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD3
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course code: CA331
Course title: DECISION SUPPORT SYSTEM
Pre-requisite(s):
Co- requisite(s): None
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives

This course enables the students:

A.	To understand the basic components of DSS
B.	To learn different phases and models for Decision making
C.	To understand how to create a distributed database using fragmentation.
D.	To learn transaction processing in a distributed environment.
E.	To understand how concurrency control is performed in a distributed environment.

Course Outcomes

After the completion of this course, students will be able to:

1.	Discuss the basic components of DSS
2.	Classify the different phases and models for Decision making
3.	Design a DSS according to the requirements.
4.	Model and develop different levels in DSS using Software engineering principles
5.	Analyse the system with pros and cons.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module I: **Introduction to DSS:** Definition. Types of DSS. Data and Model Management. DSS Knowledge Base. User interface. The DSS user. Categories and classes of DSS.	**8L**
Module II: **Decision and Decision-makers:** Definition. Types of decision. Different levels of Decision makers in the organization and their requirement. Decision effectiveness. Simon's model of decision making. Rational decision making. Bounded rationality. Biases and heuristics in decision making.	**8L**
Module III: **Group Decision Support System (GDSS):** Group decision making. GDSS modeling. Brainstorming process. MDM support technologies. Managing MDM activities. System perspective of a DSS: DSS in the context of information system. Information quality issues in DSS design. Role of internet in DSS development.	**8L**
Module IV: **Designing and building DSS:** Strategies for DSS analysis and design. The DSS developer. Tools for DSS development. Implementing and Integrating DSS: DSS implementation. System evaluation. The importance of integration.	**8L**
Module V: **Intelligent Decision Support system:** The intelligence of Artificial Intelligence. Future of Expert and Artificial	**8L**

Intelligence. Knowledge acquisition for Expert Systems. Future of Intelligent Software Agents and Delegation.	

TEXT BOOK

2. MarakasGeorge M., "Decision Support Systems in the 21st century", Pearson education.

REFERENCE BOOKS

4. TurbanEfraim, "Decision Support Systems and Intelligent Systems", Pearson Education.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Adoption of Information System
2. Selection of Strategy
3. Optimization Methods

POs met through Gaps in the Syllabus

3, 4, 12

Topics beyond syllabus/Advanced topics/Design

1. Model Development
2. Use of AI for Decision Making

POs met through Topics beyond syllabus/Advanced topics/Design

2, 3, 4, 12

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Mid Semester Examination	25
Second Quiz	10
Teacher's Assessment	5
End Semester Examination	50

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1				2	2	3	1
CO2	3	3	3	1	3	1	1	1				2	3	2	2
CO3	3	3	3	3	3	1	2	2		1	1	2	3	2	2
CO4	3	3	3	1	3		1	1		1	1	2	3	2	1
CO5	3	3	3	3	3	1	1	1	1	1	1	2	2	3	2

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CD Code	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD7, CD 8
CD2	Tutorials/Assignments	CO2	CD1 and CD9
CD3	Seminars	CO3	CD1, CD2 and CD3
CD4	Mini Projects/Projects	CO4	CD1 and CD2
CD5	Laboratory Experiments/Teaching Aids	CO5	CD1 and CD2
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

PROGRAM ELECTIVES(LIST OF SKILL DEVELOPMENT COURSES)

PROGRAM ELECTIVE (SECI)

Course Code: CA180
Course Title: OFFICE AUTOMATION TOOLS
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

1.	To learn automation tools
2.	To understand the basic of basic technology
3.	To learn the problem-solving process through computer.
4.	To know the limitations of automation
5.	To know the practical application of various automation tools

Course Outcomes

After the completion of this course, students will be able to:

CO1	To solve real time problems using automation tools
CO2	To translate the real time problem into automation problem
CO3	To analyse the basic application of automation tools.
CO4	To apply different tools for different automation problems
CO5	To decompose a real-time problem into a small automation problems.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **COMPUTER SCIENCE & OPERATING SYSTEMS (WINDOWS/LINUX)** **Types of Computer:** Analog, Digital, and Hybrid type, Hardware, Software, System software, Application software, Stored Program Concept and Von Newman Architecture, Firm ware, Human ware, Stored Program Concept, Evolution of computers, Generation of computer. **Data Processing:** Data collection, Classifications, Sorting and Merging, Processing, Summarizing Storing. **Data Organisation:** Organization Data, Character, Field, Record, File, Database, Sequential Access, Random Access, Indexed Sequential Access. **Data Communication:** Local Area Network, Wide Area Network, Satellite Communication, Internet. **Operating System:** Introduction, Different Operating Systems, Loading and Quitting the Operating Systems Important DOS/Windows/Linux Commands.	**10**
Module – II **WINDOWS/Linux** 1. Windows Introduction, 2. Concepts different Operating System GUI/CUI. 3. Desktop Icons. (Windows / Desktop Linux) 4. My Computer, Recycle Bin, Internet Explorer, Network Neighbourhood, My Documents 5. Working with windows: How to create a Folder, Copying and cutting files, Renaming 6. Programs, Favourites, Documents, Settings, Find, Run, Shut down 7. APPLICATION ICONS 8. Introduction to Output Devices	**10**
Module – III **PERSONAL COMPUTER SOFTWARE TOOLS (MS WORD,** 1. Open Office Word Processing using MS WORD: An introduction to MS-Word / ON INTRODUCTION TO WORD/Writer.	**7**

2. The Word work space, Starting and quitting word, Creating and Manipulating Various documents, Editing of proofing files, Merging documents and macros. 3. How to use Mouse and Menu, Working with dialog box 4. Primary Command in File Menu: The Open Commands, The File name commands, The New commands, The Save, Save As, and Save all commands, The Close command, The Page setup, The Print commands, The Exit commands 5. Edit Menu commands: The Cut, Copy, and Paste commands, The Undo and Repeat commands 6. Format commands: Font commands, Paragraph commands 7. Other Menu: The view menu, The Insert menu, The tool menu, The table menu, The Window menu	
Module – IV **EXCEL** 1. BUILDING A SIMPLE WORKSHEET 2. Entering Text, Entering Values, Entering Dates and Times, Moving Around, Selecting Ranges, Using Menu, Using 3. Tool Bar, Using Shortcut Menus, Changing Entries, Copying Entries, Moving Entries, Inserting and Deleting cells 4. FORMATTING BASICS 5. Changing Character Style, Changing Alignment, Changing Column Width 6. WORKING WITH MULTIPLE WORKSHEET 7. Copying entries between work books, Moving sheets between work books, Deleting sheets, Quitting Excel 8. OPENING EXISTING WORKBOOKS 9. Simple calculations, Doing Arithmetic, Totalling column of values, Naming cells and Ranges 10. FORMATTING TEXT 11. Displaying dollars and cents, Formatting decimal places, dates Format, Copying style and formats 12. FORMULAS THAT MAKE DECISIONS 13. Using the IF function, Using the nested IF function, Copying formulas 14. Checking Spelling, Printing Worksheets, Preview Worksheets, Setting up the pages, 15. Sorting data, Keeping Leading in View, Finding records, Adding and deleting Records, Filtering Records 16. Plotting charts, Sizing and moving charts, Updating charts, changing the chart type, Using chart auto format 17. Creating Macros, Recording Macros, Running Macros	**8**
Module – V	**5**

POWER POINT

1. Main Features of Power Point
2. MAKING THE PRESENTATION
3. Creating Template with the Auto Content Wizard. Creating a Presentation with a Template. Creating a presentation from Scratch
4. DIFFERENT VIEWS
5. Normal Slide, Outline, Slide Sorter, Slide Show, Notes, Slide Master
6. ANIMATION, ART AND SOUND
7. Controlling Transitions between slides. Animating Different Parts of a slide. In
8. Sounds in slides.
9. INCLUDING GRAPHS, CHARTS, TABLES AND COLUMNS
10. Organization Chart Slide, Creating a table Slide. Creating two column Slide, Module 1: Showing A Presentation,
11. Rehearsing/ Timing a Presentation, Designation some slides as "Hidden", Viewing Slides Anywhere in a Slide Show.
12. Techniques for Making a Show Livelier
13. OFFICE CONNECTIONS
14. Presenting with the help of other Office Programs Importing the text from a World Document.
15. Printing a Presentation

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Introduction to graphics and animation tool.
2. Multimedia Introduction.

POs met through Gaps in the Syllabus

1,2,3,4

Topics beyond syllabus/Advanced topics/Design

3. Animation.
4. App development.

POs met through Topics beyond syllabus/Advanced topics/Design

3, 5, 7, 8,

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
CD1	Lecture by use of Boards/LCD Projectors	CO1	CD1, CD8
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CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		

CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

PROGRAM ELECTIVE (SEC-II)

Course Code: CA181
Course Title: DESIGNING AND PUBLISHING IN COMPUTER USING PAGEMAKER, PHOTOSHOP AND CORELDRAW LAB.
Pre-requisite(s): C/C++; Knowledge of programming languages
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: II/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A	Able to create a new document using page maker
B	Learn the advantages of PageMaker
C	To understand the idea of Photoshop
D	To know the applications of PageMaker and Photoshop.
E	To understand the basic concepts of coral draw

Course Outcomes

After the completion of this course, students will be able to:

1	Identify the application of Photoshop, coral draw and PageMaker
2	Apply the basic idea of PageMaker to create and modify a page
3	To analyse a photo using Photoshop
4	Apply PageMaker to manage a page in better way
5	Create a template to solve a real time problem

SYLLABUS

1. **PAGEMAKER**
2. **INTRODUCTION**
    i. Introduction to Desk Top Publishing, Introduction to Page Maker Advantages, Using the Mouse, Components of the Page Maker Window
3. **CREATING A NEW DOCUMENT**
    i. Setting the Margins, Setting the Page Size, Changing the page Orientation, Setting Page Numbers, Changing the Page Size view, Creating New Document Windows: Displaying the Rulers, Changing the Rulers, Using Rulers, Using Guidelines, Positioning Guidelines., Adding Guidelines to Master Pages. Aligning to Guidelines, Displaying Guidelines, Locking Guidelines. Formatting Types: Changing Font Families, Changing Fond Sizes, Changing Typeface Style, Changing Character Specifications: Changing Type leading, Changing Character Widths, Changing Tracking, Changing Type Options. Saving Your Document: Saving a new Document, Saving an existing Document, Saving a Document as another document, Reverting to a Previously Saved Version. Developing Paragraphs: Typing Text, Adding special Characters to Text, Aligning Text. Formatting paragraphs: Changing Indents, Changing the space around Paragraphs, Changing paragraph Alignment, controlling How Paragraphs Break Between Pages and Columns, Adding lines Above or Below Your Paragraphs.
4. **INTRODUCTION TO CREATING FRAMES**
    i. Converting Other Objects to Frames, Threading and Unthreading Text. Threading additional Text, Threading Text to Different Page, Unthreading Text Blocks, Rethreading Text Blocks, Making Text Blocks Disappear Without Deleting them, Selecting and Dragging Text, Editing Deleting Text, Cut, Copying, Pasting Text, Viewing the Contents of Clipboard, Using Undo and Revert. Inserting and Removing Pages: Inserting and Removing Pages, Adjusting Spacing of Characters, Words, Lines Adjusting, Spacing and Leading, Setting and changing Tabs.
5. Introduction to Auto Flow, page maker Plug-Ins, Drop Cap, Change Case, Bullets and Numbering.
6. **ADDING DESIGN ELEMENTS-INTRODUCTION**
    i. Adding Graphics to your Document, Adding Lines, Changing Lines Specifications, Adding Shapes, changing Shape specifications, Changing Line and fill, Specifications together (Fill and Stroke), Changing Round Corners, Creating Drop-Shadow, Boxes, Text wrap, Changing page maker Options: Adjusting Margins, Setting and Adjusting Columns, Setting Unequal Width Columns, Creating headers and Footers, Creating Graphics in page maker, Rotating Text, Skewing and Mirroring objects with Control Palette. Importing Graphics into page maker: Placing, Sizing, aligning Graphics, Cropping Graphics.
7. **SETTING UP TEMPLATES**
    i. Setting Up Master Page Templates, Creating Custom Page Sizes, Creating Custom Boarders, Creating a News Paper Template, Creating New master Pages, Saving an existing Page As a Master Page. Setting UP Custom Styles: Defining Styles, Creating, Editing, Removing Styles and Copying Styles.

8. **Introduction to Using layers**

TEXT BOOK

1. KumarArchana, “Computer Basics with office Automation”, IK International Publishing,2010, ISBN 9789380578620.

REFERENCE BOOK

1. Prof. JainSatish, Kratika, GeethaM., “BPB's Office 2010 Course Complete Book For Learning Better And Faster”.

Lab Section [each Day 50 mints x 2 = 100 mints]

1. Installation of Operating Systems
2. Working with Windows Operating system.
3. Get familiar with Linux Operating.
4. Lab in MS-Word/ Writer
5. Document formatting in word/Mail Merge
6. Printing in Word.
7. Lab in MS-Excel
8. Formatting in Excel
9. Working with Multiple worksheet/Formulas/Sorting /Filtering
10. How to configure a Samba Server
11. Graphs in Excel.
12. Introduction to Desk Top Publishing.
13. Creating documents using Adobe Photoshop.
14. Lab in Photoshop.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA280
Course Title: HTML PROGRAMMING
Pre-requisite(s):
Co- requisite(s): Problem Solving And Programming In Html, Xml. Servlet , Jsp
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: I/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A	Able to understand the basic concepts of HTML
B	Learn the advantages of HTML
C	To understand the structure of HTML page
D	To know the applications of HTML
E	To understand the difference between HTML with other language

Course Outcomes

After the completion of this course, students will be able to:

1	Able to create a HTML page
2	Able to analyse a HTML page
3	Able to modify a HTML page
4	Able to create a HTML page using table, background and picture.
5	Able to use CSS for a HTML page.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I Introduction (1L): HTML Document structure The Basics (2L): Head, Body, Lists: ordered & unordered	**8**

Module – II Links (3L): Introduction, Absolute links & Relative links, using the ID attribute to link within a document	**8**
Module – III Images (2L): Putting an image on a page, using images as links, putting an image in the background	**8**
Module – IV Tables (3L): Creating a table, Table headers, spanning multiple columns, styling table Forms (3L): Basic input and attributes, other kinds of inputs, styling forms with CSS	**8**
Module – V **PHP Programming** **Introduction to PHP:** PHP introduction, important tools & s/w requirement, Scope of PHP, Basic syntax, variable & constants, data type, expressions, scope of variables, operators. **Handling HTML form with PHP:** Capturing form data, GET and POST methods, Dealing with multi value fields, Redirecting a form after submission **PHP conditional events & loops:** PHP conditional statements, switch case, while, for and do … while loops **PHP functions:** Need of function, Default argument, Functions call by value and call by reference **String Manipulation & regular expression:** Creating and accessing string, Searching & replacing string, formatting, joining and splitting String, String related library functions **Array:** Creating index based and Associative array **S/w Lab based on PHP:** a) Create a PHP login page having user name and password. On clicking submit button, a Welcome message should be displayed if the user is already registered otherwise error message should be displayed. b) Create a "birthday countdown" script which will count the number of days between current day and birthday.	**8**

Text Books:

1. "Introduction to HTML and CSS", O'Reilly, 2010.
2. DuckettJon, "HTML and CSS", John Wiley, 2012.

S/w Lab based on HTML:

1. Create an HTML document with the following formatting options:
   a. Text formatting
   b. Heading styles
   c. Font (Type, size and color)
   d. Background (colored background and image in background)
   e. Paragraph/ Division

2. Create a HTML document which consists of
   a. Ordered List
   b. Unordered List
   c. Nested List
   d. Image
3. Create a HTML document which implements internal/ external linking
4. Create a table with the view
5. Create a form using HTML tags which has the following type of controls:
   a. Text Box
   b. Option/ radio buttons/ Check box
   c. Reset and Submit buttons
   d.

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

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CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

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CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

PROGRAM ELECTIVE (SEC-III)

Course Code: CA281
Course Title: PROGRAMMING IN VISUAL BASIC/GAMBAS
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: I/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A	Able to understand the basic concepts of Visual Basic
B	Learn the advantages of Visual Basic
C	To understand the structure of Visual Basic
D	To know the applications of Visual Basic L
E	To understand the difference between Visual Basic with other language

Course Outcomes

After the completion of this course, students will be able to:

1	Able to create a Visual Basic project
2	Able to solve real-time problem using Visual Basic
3	Able to analyse any logical and numerical problems using Visual Basic
4	Able to create a form using Visual Basic
5	Able to create an application using frontend and backend

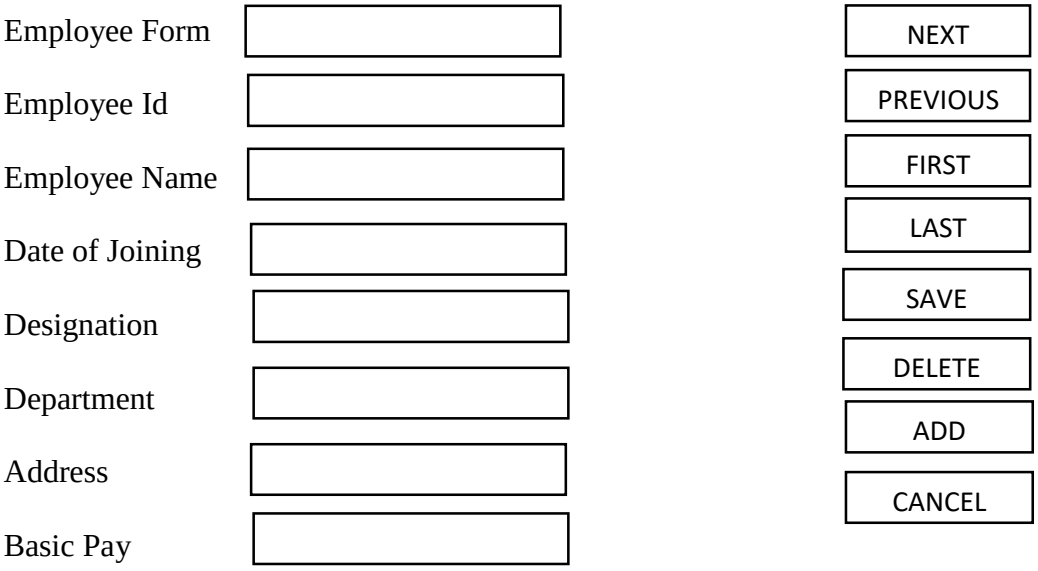
SYLLABUS

List of Programs as Assignments:

1. Print a table of numbers from 5 to 15 and their squares and Cubes.
2. Print the largest of three numbers.
3. Find the factional of a number n.

4. Enter a list of positive numbers terminated by zero. Find the sum and average of these numbers.
5. A person deposits Rs. 1000 in a fixed account yielding 5% interest. Complete the amount in the account at the end of each year for n years.
6. Write a VB application to choose your hobbies from a list.
7. Read n numbers. Count the number of negative numbers, positive numbers and zeroes in the list. Use arrays.
8. Read a single dimension array. Find the sum and average of these numbers.
9. Read a two dimension array. Find the sum of two 2D Array.
10. Create a database Employee and Make a form in VB 6.0 to allow data entry to

Employee Form with the following command buttons:



Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CO3	2	3	3	1	2	1	2	2	1	1	1	2	2	2	3
CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

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CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA284
Course Title: PROGRAMMING IN SCI LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: I/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course envisions to impart to students to:

A	Able to understand the basic concepts of SCILAB
B	Learn the advantages of SCILAB
C	To understand the structure of SCILAB
D	To know the applications of SCILAB
E	To understand the difference between SCILABwith other language

Course Outcomes

After the completion of this course, students will be able to:

1	Able to write a SCILAB program
2	Able to solve real-time problem using SCILAB
3	Able to analyse any logical and numerical problems using SCILAB
4	Able to create a function using SCILAB
5	Able to create an 3D histogram using 3D histogram

SYLLABUS

List of Programs as Assignments:

1. Write a program in scilab to input an one dimensional array and a 2D array in the console.
2. Write a program in scilab to input a zero array.
3. Write a program in scilab to Input an identity array.
4. Write a program in scilab to input a variable.
5. Write a program in scilab to use the Plot function for drawing a sine wave.
6. Write a program in scilab for 3D ploting using surf function.
7. Write a program in scilab to use the scf and clf function.
8. Write a program in scilab to show the use of histplot.
9. Write a program in scilab to find the area of triangle.
10. Write a program in scilab to find the area of a rectangle.
11. Write a program in scilab to find the addition of two simple 1D array.
12. Write a program in scilab to find all the possible operations on array.
13. Write a program in scilab to find the length of an array.
14. Write a program in scilab to demonstrate the use of matplot function.
15. Write a program in scilab to show the use of champ function.
16. Write a program in scilab for random number generation using all the function possible in scilab for random number generation.

17. Write a program in scilab to show the use of plot2d2 function.
18. Write a program in scilab to show the use of plot2d3 function.
19. Write a program in scilab to show the use of plot2d4 function.
20. Write a program in scilab to show the use of LineSpec function.
21. Write a program in scilab to find the perimeter of parallelogram.

22. Write a program in scilab to find the volume of an sphere.
23. Write a program in scilab to find the possible operations on complex numbers.
24. Write a program in scilab to find the division of a complex number.
25. Write a program in scilab to display maximum among five numbers.
26. Write a program in scilab to show the animation using comet function.
27. Write a program in scilab to show the animation using paramfplot2d function.
28. Write a program in scilab to show the 3D histogram.
29. Write a program in scilab to calculate the nature of roots of a quadreatic equation. Input data from user.
30. Write a program in scilab to perform the operation on data Through File Reading and Writing.

Gaps in the Syllabus (to meet Industry/Profession requirements)

1. Applications based on have not been discussed
2. Problem based on graph has been discussed.

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)	Program Specific Outcomes

													(PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
CO1	3	3	3	2	1	1	2	2	1	1	1	1	1	2	2
CO2	3	1	1	1	1	3	1	1	2	1	1	2	3	2	3
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CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping Between COs and Course Delivery (CD) methods

CDCode	Course Delivery Methods	Course Outcome	Course Delivery Method Used
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CD5	Laboratory Experiments/Teaching Aids	CO5	CD1, CD2 and CD9
CD6	Industrial/Guest Lectures		
CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

PROGRAM ELECTIVE (SEC-IV)

Course Code: CA380
Course Title: TALLY SOFTWARE (ACCOUNTING AND FINANCETALLY ERP)
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students to:

A	Able to understand the basic concepts of TALLY
B	Learn the advantages of TALLY
C	To understand the structure of TALLY
D	To know the applications of TALLY IN accounting
E	To understand the difference between TALLY with other language

Course Outcomes

After the completion of this course, students will be able to:

1	Able to write a TALLY program
2	Able to solve real-time problem using TALLY
3	Able to analyse any logical and numerical problems using TALLY
4	Able to create a function using TALLY
5	Able to create an accounting software.

SYLLABUS

1. How would you create a computer in Tally.
2. How would you create a Ledger, Group in Tally.
3. How would you display ,alter & delete the Ledger.
4. Describe the process of entering Vouchers
5. Contra, Payment, Receipt, Journal, Sales, Purchase.
6. How would you display ,alter & delete the Vouchers
7. Describe the various options of reports
8. Day Books Cash and Bank & Ledgers Books
9. How would you display Trail Balance, Profit & Loss Statement.
10. Balance Sheet in columns and rows.
11. How would you cost categories with cost centers in tally
12. Various options in tally shortcut or Function Key
13. Various options printing reports in Tally.
14. Understand by cash flow and fund flow in tally
15. Describe the Accounts with Inventory company in Tally
16. Create a Stock, Stock Unit & Alternate units, Stock Group & Stock Item
17. Describe the sales voucher, Sales invoice and purchase invoice.
18. How would you display stock group and stock item.
19. How would you sales & purchase with tax Auto calculation
20. Sales bill with auto discount calculation
21. Employee payroll in tally.
22. How would you delete a company, Modify company.

Text Books:

Reference Books:

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
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Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

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CO4	1	1	3	3	1	1	1	1	1	1	1	1	2	3	3
CO5	3	3	3	1	2	1	1	2	1	1	2	1	1	2	3

Correlation Levels 1, 2 or 3 as defined below:

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CD6	Industrial/Guest Lectures		

CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		

Course Code: CA381

Course Title: PHOTO SHOP LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2 L:0 T:0 P:4
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students to:

A	Able to understand the basic concepts of Photo Shop
B	Learn the advantages of Photo Shop
C	To understand the structure of Photo Shop
D	To know the applications of Photo Shop
E	To understand the difference between Photo Shop with other related softwares

Course Outcomes

After the completion of this course, students will be able to:

1	Able to analyze any photo using Photo Shop
2	Able to apply use layer masks, filters and blending modes
3	Able to create, edit and work with text
4	Able to Design layouts for web pages, Paper Adverts, Brouchers, CD Covers, Package Designing
5	Able to create new layers and perform other basic layer functions

SYLLABUS

1. Interface Photoshop and workspace, Document setup width height & resolution.

2. What are the kinds of Tools in the toolbox? (Tool Palette and Interface - The Tool Palette - Painting and Editing - Custom Brushes)

3. Using selection tools, transform, marquee, crop, lesso, magic wand, eraser etc.(Basic Photo Corrections - Rotating, Scaling, and Distorting with Transformations - Feathering and Info Palette - Understand Resolution - Touch up Tools)

4. What are foreground and background colors?

5. How do you change the size of a picture?

Text Books:

Reference Books:

Gaps in the Syllabus (to meet Industry/Profession requirements)

POs met through Gaps in the Syllabus

Topics beyond syllabus/Advanced topics/Design

POs met through Topics beyond syllabus/Advanced topics/Design

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
First Quiz	10
Second Quiz	10
Viva voce	20
Day to day performance	30
Exam Evaluation performance	30

Indirect Assessment

1. Students' Feedback on Course Outcome.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CD7	Industrial Visits/In-plant Training		
CD8	Self- learning such as use of NPTEL Materials and Internets		
CD9	Simulation		