Bachelor of Computer Application (Honours)

L T P - Indicates Theory Lectures (L), Tutorial(T) and Practical (P) classes per week.
1L Earns 1 credits
1P Earns 0.5 credits
1T Earns 1 Credit

Semester I							
Sl. No.	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory + Practical							
1	**CC1**	**BCAC101 BCAC191**	**Programming for Problem Solving**	**4**	**0**	**4**	**6**
2	CC2	BCAC102 BCAC192	Digital Electronics	4	0	4	6
3	**AEC-1**	**BCAA101**	**Soft Skills**	**2**	**0**	**0**	**2**
4	GE-1	GE-Basket	Any one from GE-Basket	4/5	0/1	4/0	**6**
			Total Credit				20

CC: Core Course
GE: General Electives (To be selected from GE Basket)
AEC: Ability Enhancement Course
SEC: Skill Enhancement Course

Bachelor of Computer Application
Semester-1

Name of the Course: BCA **Subject:** Programming for Problem Solving	
Course Code: BCAC101 + BCAC191	**Semester: 1st**
Duration: 36 Hours	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5

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Practical: 4		Continuous Assessment: 25	
Credit: 4 + 2		Practical Sessional internal continuous evaluation: 40	
		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1	In-depth understanding of various concepts of programming language.		
2	Ability to read, understand and trace the execution of programs		
3	Skill to debug a program.		
4	Skill to write program code in C to solve real world problems.		
Objective:			
Sl. No.			
1	To introduce students to a powerful programming language		
2	To understand the basic structure of a program		
3	To gain knowledge of various programming errors.		
4	To enable the students to make flowchart and design an algorithm for a given problem.		
5	To enable the students to develop logics and programs		
Pre-Requisite:			
Sl. No.			
1	Understanding of basic mathematical logic.		
Contents			
Chapter	**Name of the Topic**	**Hours**	**Marks**

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01	Introduction to Computers Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts. Number Systems: Binary, Octal, Decimal, Hexadecimal Introduction to C Language - Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements Arithmetic Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions.	6	10
02	Conditional Control Statements Bitwise Operators, Relational and Logical Operators, If, If- Else, Switch-Statement and Examples. Loop Control Statements: For, While, DoWhile and Examples. Continue, Break and Goto statements Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing. Recursion- Recursive Functions.. Storage Classes: Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers.	8	10
03	Preprocessors and Arrays Preprocessor Commands Arrays - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble Sort.	8	10
04	Pointers Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, Lvalue and Rvalue, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command Line Arguments. Strings - Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions.	**8**	**20**
05	Structures and File Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions, Type Definition (typedef), Enumerated Types. Input and Output: Introduction to Files, Modes of Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.	**6**	**20**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**
Practical			

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Course Code: BCAC191
Credit: 2
Skills to be developed:
Intellectual skills:

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

List of Practical:

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

Assignments:
Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

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

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

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1.	Computer with moderate configuration
2.	A programming language compiler

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	**Unit**	**Objective Questions** (MCQ only with the correct answer)		**Subjective Questions**			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 5	10	10				
B	1 to 5			5	3	5	70

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C	1 to 5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)	**10**	
Viva voce	**5**	

Name of the Course: BCA
Subject: Digital Electronics

Course Code: BCAC102 + BCAC192	**Semester: 1st**
Duration: 48 Hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**

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Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1	To gain skill to build and troubleshoot digital logic circuits
2	To gain skill to use the methods of systematic reduction of Boolean expressionusingK-Map
3	To be able to interpret logic gates and its operations
4	Familiarization with semiconductor memories in electronics.

Objective:	
Sl. No.	
1	To gain basic knowledge of digital electronics circuits and its levels.
2	To understand and examine the structure of various number system and its conversation.
3	To learn about the basic requirements for a design application
4	To enable the students to understand,analyze and design various combinational and sequential circuits
5	To understand the logic functions, circuits, truth table and Boolean algebra expression

Pre-Requisite:	
Sl. No.	**None**

Contents			
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Number Systems & Codes**	**5**	**10**

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	Decimal Number, Binary Number, Octal Number, Hexadecimal Number, Conversion – Decimal to Binary, Binary to Decimal, Octal to Binary, Binary to Octal, Hexadecimal to Binary, Binary to Hexadecimal, Octal to Binary to Hexadecimal, Hexadecimal to Binary to Octal; Floating Point Number Representation, Conversion of Floating Point Numbers, Binary Arithmetic, 1's and 2's Complement, 9's and 10's Complement, Complement Arithmetic, BCD, BCD addition, BCD subtraction, Weighted Binary codes, Non-weighted codes, Parity checker and generator, Alphanumeric codes.		
02	**Logic Gates** OR, AND, NOT, NAND, NOR, Exclusive – OR, Exclusive – NOR, Mixed logic.	**2**	**10**
03	**Boolean Algebra** Boolean Logic Operations, Basic Law of Boolean Algebra, Demorgan's Theorem, Principle of Duality.	**4**	**10**
04	**Minimization Techniques** Sum of Products, Product of Sums, Karnaugh Map [up to 4 variables].	**3**	**10**
05	**Multilevel Gate Network** Implementation of Multilevel Gate Network, Conversion to NAND-NAND and NOR-NOR Gate Networks.	**2**	**5**
06	**Arithmetic Circuits** Half Adder, Full Adder, Half Subtractor, Full Subtractor, Carry Look Ahead Adder, 4-Bit Parallel Adder	**5**	**5**
07	**Combinational Circuits** Basic 2-input and 4-input multiplexer, Demultiplexur, Basic binary decoder, BCD to binary converters, Binary to Gray code converters, Gray code to binary converters, Encoder.	**5**	**5**

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08	**Sequential Circuits** Introduction to sequential circuit, Latch, SR Flip Flop, D Flip Flop, T Flip Flop, JK Flip Flop, Master Slave Flip Flop	**5**	**5**
09	**Basics of Counters** Asynchronous [Ripple or serial] counter, Synchronous [parallel] counter	**2**	**5**
10	**Basics of Registers** SISO, SIPO, PISO, PIPO, Universal Registers	**3**	**5**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Assignments:

Based on the curriculum as covered by subject teacher.

Practical
Course Code: BCAC192
Credit: 2

List of Practicals:-

1. Realization of basic gates using Universal logic gates.
2. Code conversion circuits- BCD to Excess-3 and vice-versa.
3 Four-bit parity generator and comparator circuits.
4. Construction of simple Decoder and Multiplexer circuits using logic gates.
5. Design of combinational circuit for BCD to decimal conversion to drive 7-segment display using multiplexer.
6. Construction of simple arithmetic circuits-Adder, Subtractor.
7. Realization of RS-JK and D flip-flops using Universal logic gates.
8. Realization of Universal Register using JK flip-flops and logic gates.
9. Realization of Universal Register using multiplexer and flip-flops.
10. Realization of Asynchronous Up/Down counter.
11. Realization of Synchronous Up/Down counter.
12. Realization of Ring counter and Johnson's counter.
13. Construction of adder circuit using Shift Register and full Adder.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

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Salivahan	Digital Circuit & Design		VIKAS
M. Morris. Mano & Michael D. Ciletti	Digital Design		PEARSON
Anand Kumar	Fundamentals of Digital Circuits		PHI
Reference Books:			
Tokheim	Digital Electronics		TMH
S. Rangnekar	Digital Electronics		ISTE/EXCEL

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	**Unit**	**Objective Questions** (MCQ only with the correct answer)		**Subjective Questions**			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 10**	**10**	**10**				
B	**1 to 10**			**5**	**3**	**5**	**70**
C	**1 to 10**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	**Chapter**	**Marks of each question**	**Question to be set**	**Question to be answered**
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**

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C	**All**	**15**	**5**	**3**

Name of the Course: BCA **Subject: Soft Skills**	
Course Code: BCAA101	**Semester: 1st**
Duration: 36 Hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 2	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 0	Continuous Assessment: 25
Credit: 2	Practical Sessional internal continuous evaluation: 0
	Practical Sessional external examination: 0

Aim:

Sl. No.	
1.	Ability to read English with ability to read English with understanding and decipher paragraph patterns, writer techniques and conclusions
2.	Skill to develop the ability to write English correctly and master the mechanics of writing the use of correct punctuation marks and capital letter
3.	Ability to understand English when it is spoken in various contexts.

Objective:

Sl. No.	
1.	To enable the learner to communicate effectively and appropriately in real life situation
2.	To use English effectively for study purpose across the curriculum
3.	To use R,W,L,S and integrate the use of four language skills, Reading, writing , listening and speaking.
4.	To revise and reinforce structures already learnt.

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Aim:			
Pre-Requisite:			
Sl. No.			
1.	Basic knowledge of English Language.		
Contents			
Chapter	**Name of the Topic**	**Hours**	**Marks**
02	**Grammar** Correction of sentence, Vocabulary / word formation, Single word for a group of words, Fill in the blank, transformation of sentences, Structure of sentences – Active / Passive Voice – Direct / Indirect Narration.	**6**	**10**
03	**Essay Writing** Descriptive – Comparative – Argumentative – Thesis statement- Structure of opening / concluding paragraphs – Body of the essay.	**5**	**10**
04	**Reading Comprehension** Global – Contextual – Inferential – Select passages from recommended text .	**5**	**10**
05	**Business Correspondence** Letter Writing – Formal.Drafting.Biodata- Resume′- Curriculum Vitae.	**5**	**10**
06	**Report Writing** Structure , Types of report – Practice Writing.	**5**	**10**
07	**Communication skills** Public Speaking skills , Features of effective speech, verbal-nonverbal.	**5**	**10**
08	**Group discussion** Group discussion – principle – practice .	**5**	**10**
	Sub Total:	**36**	**70**

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	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Mark MaCormack	Communication		
John Metchell	How to write reports		
S R Inthira & V Saraswathi	Enrich your English – a) Communication skills b) Academic skills		CIEFL & OUP
Reference Books:			
R.C. Sharma and K.Mohan	Business Correspondence and Report Writing		Tata McGraw Hill
L.Gartside	Model Business Letters		Pitman
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1	Computer with moderate configuration		
2	Audio visual Setup.		

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

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Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 8**	**10**	**10**				
B	**1 to 8**			**5**	**3**	**5**	**70**
C	**1 to 8**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)	**10**	
Viva voce	**5**	

** General Electives to be chosen from MOOCs basket based on availability of courses.

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Semester II							
Sl. No.	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory + Practical							
1	CC3	BCAC201	Discrete Structures	5	1	0	**6**
2	**CC4**	**BCAC202 BCAC292**	**Operating Systems**	**4**	**0**	**4**	**6**
3	CC5	BCAC203 BCAC293	Computer Architecture	4	0	4	**6**
4	**AECC-2**	**BCAA201**	**Environmental Science**	**2**	**0**	**0**	**2**
5	GE-2			4/ 5	0/ 1	4/ 0	**6**
Practical							
6	SEC-1	BCAS281	Minor Project and Entrepreneurship I	0	0	4	**2**

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			Total Credit	28

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Semester-2

Name of the Course:BCA **Subject: Discrete Structures**	
Course Code: BCAC201	**Semester: 2nd**
Duration: 60 Hrs	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 5	End Semester Exam: 70
Tutorial:1	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit:6	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
1.	The aim of this course is to introduce you with a new branch of mathematics which is discrete mathematics, the backbone of Computer Science.
2.	In order to be able to formulate what a computer system is supposed to do, or to prove that it does meet its specification, or to reason about its efficiency, one needs the precision of mathematical notation and techniques. The Discrete Mathematics course aims to provide this mathematical background.
Objective: Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following	
Sl. No.	
1.	Use mathematically correct terminology and notation.

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2.	Construct correct direct and indirect proofs.		
3.	Use division into cases in a proof.		
4.	Use counterexamples.		
5.	Apply logical reasoning to solve a variety of problems.		
Pre-Requisite:			
Sl. No.			
1.	**Knowledge of basic algebra**		
2.	**Ability to follow logical arguments.**		
Contents		**6 Hrs./ Week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Set Theory** Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle. Relation: Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation. Function: Definition and types of function, composition of functions, recursively defined functions.	**8**	**14**
02	**Propositional logic** Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradictions, normal forms (conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification. Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof, proof by using truth table, proof by counter example.	**12**	**14**
03	**Combinatorics** Mathematical induction, recursive mathematical definitions,	**12**	**14**

	basics of counting, permutations, combinations, inclusion-exclusion, recurrence relations (nth order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relation), generating function (closed form expression, properties of G.F., solution of recurrence relation using G.F, solution of combinatorial problem using G.F.)		
04	**Algebraic Structure** Binary composition and its properties definition of algebraic structure, Groyas Semi group, Monoid Groups, Abelian Group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).	**12**	**10**
05	**Graphs** Graph terminology, types of graph connected graphs, components of graph, Euler graph, Hamiltonian path and circuits, Graph coloring, Chromatic number. Tree: Definition, types of tree(rooted, binary), properties of trees, binary search tree, tree traversing (preorder, inorder, post order). Finite Automata: Basic concepts of Automation theory, Deterministic finite Automation (DFA), transition function, transition table, Non Deterministic Finite Automata (NDFA), Mealy and Moore Machine, Minimization of finite Automation.	**12**	**18**
	Sub Total:	**56**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**60**	**100**

Assignments:
Based on the curriculum as covered by the subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

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Kenneth H. Rosen	Discrete Mathematics and its Applications		Tata Mc.Graw Hill
seymour Lipschutz, M.Lipson	Discrete Mathematics		Tata Mc.Graw Hill
Reference Books:			
V. Krishnamurthy	Combinatorics:Theory and Applications		East-West Press
Kolman, Busby Ross	Discrete Mathematical Structures		Prentice Hall International

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	**Unit**	**Objective Questions** (MCQ only with the correct answer)		**Subjective Questions**			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 5**	**10**	**10**				
B	**1 to 5**			**5**	**3**	**5**	**60**
C	**1 to 5**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	**Chapter**	**Marks of each question**	**Question to be set**	**Question to be answered**
A	**All**	**1**	**10**	**10**

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B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Name of the Course: BCA **Subject:** Operating Systems	
Course Code: BCAC202 + BCAC292	**Semester: 2nd**
Duration: 48 Hours	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1	To understand the principles and tasks of operating systems.
2	Ability to apply CPU scheduling algorithms to manage tasks.
3	Initiation into the process of applying memory management methods and allocation policies.
4	Knowledge of methods of prevention and recovery from a system deadlock.
Objective:	
Sl. No.	
1	To deliver a detailed knowledge of integral software in a computer system –Operating System.
2	To understand the working of operating system as a resource manager.
3	To familiarize the students with Process and Memory management.

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4	To describethe problem of process synchronization and its solution.		
5			
Pre-Requisite:			
Sl. No.	**None**		
Contents			
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction Importance of OS,Basic concepts and terminology,Types of OS,Different views,Journey of a command execution,Design and implementation of OS	**6**	**10**
02	Process Concept and views, OS view of processes, OS services for process management, Scheduling algorithms,Performance evaluation; Inter-process communication and synchronisation, Mutual exclusion, Semaphores, Hardware support for mutual exclusion, Queuing implementation of semaphores, Classical problem of concurrent programming, Critical region and conditional critical region, Monitors, Messages, Deadlocks	**10**	**20**
03	Resource Manager Memory management,File management,Processor management,Device management	**8**	**20**
04	Security and related Issues Security and protection,Authentication,Protection and access control,Formal models of protection ,Worms and viruses	**8**	**5**
05	**Multiprocessor System** Multiprocessor system,Classification and types,OS functions and	**6**	**10**

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	Requirements, Introduction to parallel computing,Multiprocessor interconnection synchronization		
06	Distributed OS Introduction to distributed processing	**6**	**5**
	Sub Total:	**44**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**48**	**100**

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Practicals:

1. Basics of UNIX commands.
2. Shell programming
3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
5. Implement Semaphores
6. Implement ll File Organization Techniques a
7. Implement Bankers algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique f memory management.
12. Implement Threading & Synchronization Applications

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
A Silberschatz, P.B. Galvin, G. Gagne	Operating Systems Concepts	8th Edition	John Wiley Publications
A.S. Tanenbaum	Modern Operating Systems	3rd Edition	Pearson Education
Reference Books:			
G. Nutt	Operating Systems: A Modern Perspective	2nd Edition	Pearson Education

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End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	**Unit**	**Objective Questions** (MCQ only with the correct answer)		**Subjective Questions**			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A **B** **C**	**1 to 6** **1 to 6** **1 to 6**	**10**	**10**	**5** **5**	**3** **3**	**5** **15**	**70**

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	**Chapter**	**Marks of each question**	**Question to be set**	**Question to be answered**
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Name of the Course: BCA
Subject: Computer Architecture

Course Code: BCAC203 + BCAC293	**Semester: 2nd**
Duration: 48 Hours	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25

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Credit: 4 + 2		Practical Sessional internal continuous evaluation: 40	
		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1	To be able to understand the functionality,organization and implementation of computer system.		
2	To gain Skill to recognize the instruction codes and formats.		
3	Knowledge of the internal working of main memory, cache memory, associative memory and various modes of data transfer.		
Objective:			
Sl. No.			
1	To enable the students to understand the functionality and implementation of computer system.		
2	To familiarize with the various instruction codes and formats of different CPUs.		
3	To introduce the students to I/O and memory organization of computer system		
4	To deliver an overview of Control Unit of a computer system		
5	To learn the usage of parallel and vector processing.		
Pre-Requisite:			
Sl. No.			
Contents			
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Data Representation:** Number Systems – decimal, binary, octal, hexadecimal, alphanumeric representation, 2. Complements – 1's complement, 2' complement, 9's complement, 10' complement, [r-1]'s complement, r's complement, 3. Fixed point representation – Integer representation, arithmetic addition, arithmetic subtraction, overflow, decimal fixed point representation, 4. Floating point representation, 5. IEEE 754 floating point representation	**4**	**5**

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02	**Computer arithmetic:** Addition algorithm of sign magnitude numbers, Subtraction algorithm of sign magnitude numbers, Addition algorithm of signed 2's complement data, Subtraction algorithm of signed 2's complement data, Multiplication algorithm, Booth's algorithm, Division algorithm	**4**	**5**
03	**Register transfer and micro-operations:** Register transfer language, Register transfer, Bus system for registers, Memory transfers – memory read, memory write, Micro operations – register transfer micro operations, arithmetic micro operations, logic micro operations, shift micro operations, Binary adder, binary adder subtractor, binary incrementer, arithmetic circuit for arithmetic micro operations, One stage logic circuit,Selective set, Selective complement, Selective clear, Mask, Insert, Clear	**4**	**5**
04	**Basic Computer organization and design:** Instruction codes, Direct address, Indirect address & Effective address, List of basic computer registers, Computer instructions: memory reference, register reference & input – output instructions,Block diagram & brief idea of control unit of basic computer, 6. Instruction cycle	**4**	**5**
05	**Micro programmed control:** Control memory, Address sequencing,Micro program examples	**4**	**5**
06	**Central processing unit:** General register organization,Stack organization, Register stack, Memory stack, Stack operations – push & pop, Evaluation of arithmetic expression using stack, Instruction format, Types of CPU organization [single accumulator, general register & stack organization] & example of their instructions, 6. Three, two, one & zero address instruction, 7. Definition and example of data transfer, data manipulation & program control instructions, 8. Basic idea of different types of interrupts [external, internal & software interrupts], 9. Difference between RISC & CISC	**6**	**5**
07	**Pipeline and vector processing:** Parallel processing, Flynn's classification, Pipelining, Example of pipeline, space time diagram, speedup, Basic idea of arithmetic pipeline, example of floating point addition/ subtraction using pipeline	**6**	**10**
08	**Input – output organization:** Peripheral devices,Input – output interface, Isolated I/O, Memory mapped I/O, Asynchronous data transfer: strobe & handshaking, Programmed I/O, Interrupt initiated I/O, Basic idea of DMA & DMAC 8. Input – output processor	**6**	**10**

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09	**Memory organization:** Memory hierarchy, Main memory definition, types of main memory, types of RAM, ROM, difference between SRAM & DRAM, Cache memory, Cache memory mapping – Direct, Associative, Set Associative, CAM, hardware organization of CAM, Virtual memory, mapping using pages, page fault, mapping using segments, TLB, Auxiliary memory, diagrammatic representation of magnetic disk & hard disk drive, Definitions of seek time, rotational delay, access time, transfer time, latency	**6**	**20**
	Sub Total:	**44**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**48**	**100**

Practical
Course Code: BCAC293
Credit: 2
Skills to be developed:
Intellectual skills:

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

List of Practical:

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

Assignments:
Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
M. Morris Mano	Computer System Architecture		PEARSON
William Stallings	Computer Organization & Architecture – Designing For		PEARSON

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	Performance		
J.P. Hayes	Computer Architecture & Organisation		TATA MCGRAW HILL
Reference Books:			
T. K. Ghosh	Computer Organization and Architecture		TATA MCGRAW-HILL
Behrooz Parhami	Computer Architecture		OXFORD UNIVERSITY PRESS
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1	**Simulator and/or required kit.**		

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	**Unit**	**Objective Questions** (MCQ only with the correct answer)		**Subjective Questions**			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 9**	**10**	**10**				
B	**1 to 9**			**5**	**3**	**5**	**70**
C	**1 to 9**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

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Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**
Examination Scheme for Practical Sessional examination:				
Practical Internal Sessional Continuous Evaluation				
Internal Examination:				
Five No of Experiments				
External Examination: Examiner-				
Signed Lab Note Book(for five experiments)			**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)			**10**	
Viva voce			**5**	

Name of the Course: BCA **Subject: Environmental Science**	
Course Code: BCAA201	**Semester: 2nd**
Duration: 24 Hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 2	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 0	Continuous Assessment: 25
Credit: 2	Practical Sessional internal continuous evaluation: NA

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	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1	To enable critical thinking in relation to environmental affairs.
2	Understanding about interdisciplinary nature of environmental issues
3	Independent research regarding environmental problems in form of project report
4	Understand social interactions by which human behave and cultural values that underlay behaviors.
Objective:	
Sl. No.	
1	To create awareness about environmental issues.
2	To nurture the curiosity of students particularly in relation to natural environment.
3	To develop an attitude among students to actively participate in all the activities regarding environment protection
4	To develop an attitude among students to actively participate in all the activities regarding environment protection
Pre-Requisite:	
Sl. No.	
	None

Contents			
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction** Introduction to environment and ecology Components of the environment, environmental degradation, natural cycles of environment.	**3**	**10**
02	**Ecology** Elements of Ecology, Ecological balance, Effects of Afforestation and deforestation.	**3**	**10**

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03	**Air Pollution and Control** Atmospheric composition, Segments of atmosphere climate, weather, Atmospheric Stability, dispersion of pollutants , Sources and effects of air pollutants, primary and secondary pollutants**,** Criteria Pollutants:PM10, Source, Effect, Control , CO, NO x, **Source, Effect,** Control , SO x, Source, Effect, Control ,Lead, Ozone, Source, Effect, Control , Green house effect, Control Measures ,Depletion of ozone layer, Effects of UV exposer, Control Measures	**5**	**10**
04	**Water Pollution and Control** Hydrosphere, natural water resources and reserves, Pollutants: their origin and effects ,COD and BOD test, NBOD and CBOD , River / lake / ground water pollution , Control Measures of water pollution , Drinking water and waste water treatment	**3**	**15**
05	**Land Pollution** Lithosphere, pollutants [municipal, industrial, commercial, agricultural, hazardous solid wastes] their origin and effects , Collection and disposal of solid waste, recycling and treatment methods	**3**	**15**
06	**Noise Pollution** Sources, effects, standards and control	**3**	**10**
	Sub Total:	**20**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**24**	**100**

Assignments:

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Basu, M. and Xavier, S.	Fundamentals of Environmental Studies		Cambridge University Press,

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			2016
Mitra, A. K and Chakraborty, R.	Introduction to Environmental Studies,		Book Syndicate, 2016.
Enger, E. and Smith, B.	Environmental Science: A Study of Interrelationships,	12th edition	McGraw-Hill Higher Education
Basu, R.N	Environment		,University of Calcutta
Reference Books:			
Agrawal, KM, Sikdar, PK and Deb	A Text book of Environment		Macmillan Publication

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	**Unit**	**Objective Questions** (MCQ only with the correct answer)		**Subjective Questions**			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 6**	**10**	**10**				
B	**1 to 6**			**5**	**3**	**5**	**70**
C	**1 to 6**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	**Chapter**	**Marks of each question**	**Question to be set**	**Question to be answered**
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

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Examination Scheme for Practical Sessional examination:			
Practical Internal Sessional Continuous Evaluation			
Internal Examination:			
Five No of Experiments			
External Examination: Examiner-			
Signed Lab Note Book(for five experiments)		**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)		**10**	
Viva voce		**5**	

Name of the Course: BCA **Subject: Minor Project and Entrepreneurship I**	
Course Code: BCAS281	**Semester: 2nd**
Duration: 48 Hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 0	End Semester Exam: 0
Tutorial: 0	Attendance : NA
Practical: 4	Continuous Assessment: NA
Credit: 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1	Learning teamwork, project planning and building application, encouraging entrepreneurship

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Objective:			
Sl. No.			
1	To learn teamwork.		
2	To work with real life projects.		
3	To apply theoretical knowledge into practical field.		
4	To encourage entrepreneurship.		
Pre-Requisite:			
Sl. No.			
1	Knowledge of computer programming, reasoning and thinking ability.		
Examination Scheme for Practical Sessional examination:			
Practical Internal Sessional Continuous Evaluation 40			
Internal Examination:			
Project demonstration	**40**		
Viva	**20**		