Department of Information Technology

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 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	Computer Architecture	4	0	4	6
3	AECC-2	BCAA201	Environmental Science	2	0	0	2
4	GE-2	BCAG201 BCAG202 BCAG203 BCAG204	A. MOOCS Basket 1 B. MOOCS Basket 2 C. MOOCS Basket 3 D. MOOCS Basket 4	4 / 5	0 / 1	4 / 0	**6**
Practical							
5	SEC-1	BCAS281	Minor Project and Entrepreneurship I	0	0	4	**2**
						Total Credit	22

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL
NH-12 [Old NH-34], Simhat, Haringhata, Nadia -741249

Department of Information Technology

Bachelor of Computer Application (Honours)

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.
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:

Department of Information Technology

Bachelor of Computer Application (Honours)

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, 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.)	**12**	**14**

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,	**12**	**18**
	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.		
	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**
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

Department of Information Technology

Bachelor of Computer Application (Honours)

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

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Department of Information Technology

Bachelor of Computer Application (Honours)

Name of the Course: BCA **Subject:** Computer Architecture	
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 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.	

Department of Information Technology

Bachelor of Computer Application (Honours)

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	**4**	**5**
	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		
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	**6**	**10**

	floating point addition/ subtraction using pipeline		
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**
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:

Department of Information Technology

Bachelor of Computer Application (Honours)

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
M. Morris Mano	Computer System Architecture		PEARSON
William Stallings	Computer Organization & Architecture – Designing For Performance		PEARSON
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 **C**	**1 to 9** **1 to 9**			**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**

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**	

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Department of Information Technology

Bachelor of Computer Application (Honours)

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
	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

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Department of Information Technology

Bachelor of Computer Application (Honours)

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**
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, 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**

Examination Scheme for Practical Sessional examination:

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL
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Department of Information Technology

Bachelor of Computer Application (Honours)

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**	

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Department of Information Technology

Bachelor of Computer Application (Honours)

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		
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**		

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Department of Information Technology

Bachelor of Computer Application (Honours)

**** MOOCs Basket**

GE Basket 1		GE Basket 2		GE Basket 3		GE Basket 4	
Mathematics		Humanities and Social Sciences		General Science		Emerging Technologies, Innovation & Entrepreneurship	
1	Mathematics for Computing	1	Creative Writing	1	Climate Change and Health	1	Digital Marketing
2	Probability & Statistics	2	Business English	2	Environmental Law and Policy	2	Entrepreneurship Theory and Practice
3	Bayesian Statistics	3	Leadership	3	Environmental Informatics	3	Project Management
4	Operations Research	4	Professional Communication	4	Health Informatics	4	E-Commerce System Development
5	Data Analytics	5	E-Learning	5	Intelligence of Biological Systems	5	Effective Problem-Solving and Decision-Making
6	Applied Cryptography	6	Model Thinking	6	Simulation and Modelling Natural Processes	6	Business Analytics
7	Inferential Statistics	7	Digital Transformation and Industry 4.0	7	Bioinformatics	7	Design Thinking for Innovation