MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL
NH-12 (Old NH-34), Simhat, Haringhata, Nadia -741249
Department of Information Technology

B.Sc. in Information Technology (Blockchain Technology)

Semester I						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BITBC101	Programming for Problem Solving	3	0	0	3
2	BITBC102	English Communication	3	0	0	3
3	BITBC103	Electrical & Electronics Engineering	3	0	0	3
4	BITBC104	Mathematics for Information Technology	3	1	0	4
5	BITBC105	Introduction to Networking Protocols	3	1	0	4
Practical						
1	BITBC191	Programming for Problem Solving Lab	0	0	4	2
2	BITBC192	English Communication Lab	0	0	4	2
3	BITBC193	Electrical & Electronics Engineering Lab	0	0	4	2
		Total Credit				23

Semester II						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BITBC201	Data Structure and Algorithm with Python	3	0	0	3
3	BITBC202	Computer Networks	3	0	0	3
3	BITBC203	Data Acquisition & Processing	3	1	0	4
4	BITBC204	Discrete Mathematics	3	1	0	4
5	BITBC205	Environmental Science	1	0	0	1
Practical						
1	BITBC291	Data Structure and Algorithm with Python Lab	0	0	4	2
2	BITBC292	Computer Networks Lab	0	0	4	2
Sessional						
1	BITBC281	Project 1	0	0	4	2
		Total Credit				21

Semester III						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BITBC301	Data Privacy & Security	3	0	0	3
2	BITBC302	Design and Analysis of Algorithms	3	0	0	3
3	BITBC303	DBMS and SQL injection Attack	3	0	0	3
4	BITBC304	Access control & OS Security	3	1	0	4
5	BITBC305	Value & Ethics in Data Science	3	1	0	4
Practical						
1	BITBC391	Data Privacy & Security Lab	0	0	4	2
2	BITBC392	Design and Analysis of Algorithms Lab	0	0	4	2
3	BITBC393	DBMS and SQL injection Attack Lab	0	0	4	2
		Total Credit				23

Semester IV						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BITBC401	Secure Software Design & Enterprise Computing	3	0	0	3
2	BITBC402	Ethical hacking in Linux Environment	3	0	0	3
3	BITBC403	Intrusion Detection and Prevention	3	1	0	4
4	BITBC404	Cyber Security Vulnerabilities & Cyber Security Safeguards	3	1	0	4
5	BITBC405	Introduction to Operating System	3	1	0	4
Practical						
1	BITBC491	Secure Software Design & Enterprise Computing Lab	0	0	4	2
2	BITBC492	Ethical hacking in Linux Environment Lab	0	0	4	2
Sessional						
1	BITBC481	Project II	0	0	2	1
		Total Credit				23

Semester V						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BITBC501	Blockchain and Cryptocurrency	3	0	0	3
2	BITBC502	**Elective I** A. Human Computer Interaction B. Web Application Security C. Visual Cryptography D. Threats in Mobile Application	3	0	0	3
3	BITBC503	Cyber Law and Cyber Crime Investigation	3	1	0	4
4	BITBC504	Information and Coding Theory	3	1	0	4
Practical						
1	BITBC591	Bitcoin Wallet and Mining Software Lab	0	0	4	2
Sessional						
1	BITBC581	Major Project I	0	0	4	2
2	BITBC582	Industrial Training and Internship	0	0	2	1
		Total Credit				19

Semester VI						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**

Theory						
1	BITBC601	Incident Analysis and Threat Hunting	3	1	0	4
2	BITBC602	Malware Detection	3	1	0	4
3	BITBC603	**Elective II**	3	0	0	3
		A. Blockchain in Financial Services: Strategic Action Plan B. Blockchain and Business: Applications and Implications C. Security Assessment and Risk Analysis				
Sessional						
1	BITBC681	Grand Viva	0	0	8	4
2	BITBC682	Major Project II	0	0	8	4
		Total Credit				19

Semester	Credit
I	19
II	21
III	19
IV	19
V	21
VI	19
TOTAL	**128**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Programming for Problem Solving and Programming for Problem Solving Lab			
Course Code: BITBC101 and BITBC191		**Semester: I**	
Duration: 36 Hrs.		**Maximum Marks: 200**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		**End Semester Exam: 70**	
Tutorial: 0		**Attendance: 5**	
Practical: 4		**Continuous Assessment: 25**	
Credit: 3 + 2		**Practical Sessional internal continuous evaluation: 40**	
		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1.	Implement your algorithms to build programs in the C programming language		
2.	Use data structures like arrays, linked lists, and stacks to solve various problems		
3.	Understand and use file handling in the C programming language		
Objective:			
Sl. No.			
1.	To write efficient algorithms to solve various problems		
2.	To understand and use various constructs of the programming language		
3.	To apply such as conditionals, iteration, and recursion in programming		
Pre-Requisite:			
Sl. No.			
1.	Basic Knowledge of Computer System		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
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	**Pre-processors and Arrays** Pre-processor 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**	**16**
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**	**16**
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**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1. The ability to learn concepts and apply them to other problems. ...
2. Basic mathematical skills.
3. A passion for problem solving.
4. Confidence around a computer programming Language.

List of Practical: Sl. No. 1 to 10 compulsory & at least three from the rest)

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 using recursion.
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 using function.

Assignments:

1. Based on theory lectures.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Yashavant Kanetkar,	Let us C	13th Edition	BPB Publication
E. Balaguruswamy	Programming in ANSI C		Tata McGraw-Hill
Gary J. Bronson	A First Book of ANSI C	4th Edition	ACM
Reference Books:			
Byron Gottfried	Schaum's Outline of Programming with C		McGraw-Hill
Kenneth A. Reek	Pointers on C		Pearson
Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language		Prentice Hall of India

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

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	1,2,3,4,5	10	10				
B	3, 4, 5			5	3	5	60
C	1,2,3,4,5			5	3	15	

- Only multiple choice type questions (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:			
Continuous evaluation			**40**
External Examination: Examiner-			
Signed Lab Assignments		**10**	
On Spot Experiment		**40**	
Viva voce		**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** English Communication and English Communication Lab	
Course Code: BITBC102 and BITBC192	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 200**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

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.
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of English Language.

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**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**	**15**
02	**Essay Writing** Descriptive – Comparative – Argumentative – Thesis statement- Structure of opening	**5**	**5**

	/ concluding paragraphs – Body of the essay.		
03	**Reading Comprehension** Global – Contextual – Inferential – Select passages from recommended text.	**5**	**10**
04	**Business Correspondence** Letter Writing – Formal. Drafting. Bio data - Resume′- Curriculum Vitae.	**5**	**8**
05	**Report Writing** Structure, Types of report – Practice Writing.	**5**	**5**
06	**Communication skills** Public Speaking skills, Features of effective speech, verbal-nonverbal.	**5**	**15**
07	**Group discussion** Group discussion – principle – practice	**5**	**12**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1. Skill of Grammar
2. Various writing skills
3. Skill of reading English text
4. Skill of effective written communication

Motor Skills:

1. Skill of using Correct body language while giving a presentation
2. Various non-verbal communication skills
3. Skill of using correct gestures and expressions while speaking publicly
4. Essential approach and attitude in Group Discussion or Viva

List of Practical:

1. Honing ‘Listening Skill’ and its sub skills through Language Lab Audio device.
2. Honing ‘Speaking Skill’ and its sub skills.
3. Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch & Accent) of connected speech.
4. Honing ‘Conversation Skill’ using Language Lab Audio –Visual input, Conversational Practice Sessions (Face to Face / via Telephone, Mobile phone & Role Play Mode).
5. Introducing ‘Group Discussion’ through audio –Visual input and acquainting them with key strategies for success.
6. GD Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD.
7. Honing ‘Reading Skills’ and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non Technical Passages, Learning Global / Contextual / Inferential Comprehension.
8. Honing ‘Writing Skill’ and its sub skills by using Language Lab Audio –Visual input, Practice Sessions

Assignments:

Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
R.C. Sharma and K.Mohan	Business Correspondence and Report Writing		Tata McGraw Hill , New Delhi , 1994
.Gartside	Model Business Letters		Pitman , London , 1992
Reference Books:			
Mark MaCormack	Communication		
John Metchell	How to write reports		
S R Inthira&amp, V Saraswathi	Enrich your English – a) Communication skills b) Academic skills		CIEFL &amp, OUP
Longman	Longman Dictionary of Contemporary English/Oxford Advanced Learner's Dictionary of Current English		OUP , 1998
Maxwell Nurnberg and Rosenblum Morris	All About Words		General Book Depot, New Delhi , 1995
	A Text Book for English for Engineers &amp, Technologists		

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1.	Computer
2.	Audio Devices
3.	Visual Devices
4.	Language lab Devices and the dedicated software

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	1,2,3,4,5,6	10	10				
B	3, 4, 5, 6			5	3	5	60
C	1,2,3,4,5, 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:				
Practical Internal Sessional Continuous Evaluation				
Internal Examination:				
Continuous evaluation				**40**
External Examination: Examiner-				
Signed Lab Assignments			**10**	
On Spot Experiment			**40**	
Viva voce			**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Electrical and Electronics Engineering and Electrical and Electronics Engineering Lab			
Course Code: BITBC103 and BITBC193		**Semester: I**	
Duration: 36 Hrs.		**Maximum Marks: 200**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		**End Semester Exam: 70**	
Tutorial: 0		**Attendance: 5**	
Practical: 4		**Continuous Assessment: 25**	
Credit: 3 + 2		**Practical Sessional internal continuous evaluation: 40**	
		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1.	It aims to apply knowledge of science, mathematics, and engineering principles to solve electrical and electronics engineering problems.		
2.	It also edifies understanding the impact of electrical & electronics engineering solutions in a global,economic, environmental, and societal context.		
Objective:			
Sl. No.			
1.	To impart profound scientific & engineering knowledge to comprehend, analyze, design and create new thoughts and products for solving real life Engineering problems.		
2.	Ability to conduct experimental investigation, analyze, evaluate and interpret results in the field electrical & electronics circuits & measurements, electrical machines, power systems, control systems, power electronics & drives and microprocessor & microcontroller, electronics devices etc.		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Electrical Circuits & Measurements** Fundamental laws of electric circuits, Steady State Solution of DC Circuits – Introduction to AC Circuits -Sinusoidal steady state analysis, Power and Power factor - Single Phase and Three Phase Balanced Circuits. Classification of instruments - Operating Principles of indicating Instruments	**6**	**14**
02	**Electrical Machines** Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.	**6**	**13**

03	**Semiconductor Devices And Applications** Introduction - Characteristics of PN Junction Diode – Zener Effect - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers - Voltage Regulation. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal Amplifier.	**10**	**16**
04	**Digital Electronics** Binary Number System – Boolean algebra theorems, Digital circuits - Introduction to sequential Circuits, Flip-Flops - Registers and Counters – A/D and D/A Conversion -digital processing architecture.	**8**	**13**
05	**Fundamentals of Communication Engineering** Introduction - Elements of Communication Systems, Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Digital Communication - Communication Systems: Radio, Antenna, TV, Fax, ISDN, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).	**6**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1.
2.
3.
4.
5.

List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)

1. Verification of Kirchhoff's current and voltage laws.
2. Verification of network theorems.
3. Study of characteristics of DC motor
4. Open circuit and short circuit test on single phase transformer.
5. Familiarization of resistors using colour coded method and multimeter.
6. PN junction diode and zener diode characteristics
7. Transistor CE and CB characteristics.
8. Full wave and Half wave Characteristics
9. Study of CRO.

Assignments:

1. Based on theory

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
DP Kothari and 1.J Nagarath	Electrical Machines "Basic Electrical and Electronics Engineering		McGraw Hill Education(India) Private Limited, Third Reprint,2016
S.K. Bhattacharya	Basic Electrical and Electronics Engineering		Pearson India, 2011

Reference Books:			
Sedha R.S	Applied Electronics		S. Chand & Co., 2006
A.E.Fitzgerald, David E Higginbotham and Arvin Grabel	Basic Electrical Engineering		*Mc*Graw Hill Education(India) Private Limited, 2009
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1.	CRO/DSO, Multimeter		
2.	Function Generator		
3.	Electrical Trainer 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	1,2,3,4,5	10	10				
B	3, 4, 5			5	3	5	60
C	1,2,3,4,5			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:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject: Mathematics for Computer Science**			
Course Code: BITBC104		**Semester: I**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		End Semester Exam: 70	
Tutorial:1		Attendance: 5	
Practical:0		Continuous Assessment: 25	
Credit:4		Practical Sessional internal continuous evaluation: NA	
		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	To develop formal reasoning.		
2.	Create habit of raising questions		
3.	Knowledge regarding the use of Mathematics in Computer Science		
4.	Ability to communicate knowledge, capabilities and skills related to the computer engineer profession		
Objective: **Throughout the course, students will be expected to demonstrate their understanding of Mathematics by being able to do each of the following**			
Sl. No.			
1.	To understand and solve mathematical problems		
2.	To impart knowledge regarding relevant topics.		
3.	To familiarize students with linear Algebra, differential and integral calculus, numerical methods and statistics.		
Pre-Requisite:			
Sl. No.			
1.	**Knowledge of basic algebra, trigonometry and calculus.**		
Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Modern algebra** Set, Relation, Mapping, Binary Operation, Addition Modulo n, Multiplication modulo n, semi group, properties of groups, subgroup.	**3**	**7**
02	**Trigonometry** Radian or circular Measure, Trigonometric Functions, Trigonometric ratios of angle θ when θ is acute, trigonometric ratios of certain standard angles, allied angles, compound angles, multiple and sub- multiple angles.	**3**	**5**
03	**Limits and Continuity** The real number system, The concept of limit, concept of continuity.	**2**	**5**
04	**Differentiation** Differentiation of powers of x, Differentiation of ex and log x, differentiation of trigonometric functions, Rules for finding derivatives,	**4**	**10**

	Different types of differentiation, logarithmic differentiation, differentiation by substitution, differentiation of implicit functions, differentiation from parametric equation. Differentiation from first principles.		
05	**Integrations** Integration of standard Functions, rules of Integration, More formulas in integration, Definite integrals.	**4**	**10**
06	**Differential equations** First order differential equations, practical approach to Differential equations, first order and first degree differential equations, homogeneous equations. Linear equations, Bernoulli's equation, Exact Differential Equations.	**4**	**6**
07	**Complex Numbers** Complex Numbers, Conjugate of a complex number, modulus of a complex Number, geometrical representation of complex number, De Moivre's theorem, n^{th} roots of a complex number.	**3**	**5**
08	**Matrices and Determinants** Definition of a matrix, Operations on matrices, Square Matrix and its inverse, determinants, properties of determinants, the inverse of a matrix, solution of equations using matrices and determinants, solving equations using determinants.	**4**	**7**
09	**Infinite Series** Convergence and divergence, series of positive terms, binomial series, exponential series,logarithmic series.	**3**	**5**
10	**Probability** Concept of probability, sample space and events, three approaches of probability, kolmogorov's axiomatic approach to probability, conditional probability and independence of events, bay's theorem.	**3**	**5**
11	**Introduction to Statistics** Measures of central Tendency, Standard Deviation, Discrete series. Methods, Deviation taken from assumed mean, continuous series, combined standard deviation, coefficient of variation, variance.	**3**	**5**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

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

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
S. K. Mapa	Higher Algebra		Levant Books
Chakravorty and Ghosh	Advanced Higher Algebra		U N Dhar Pvt. Ltd

Reference Books:			
Das and Mukherjee	Integral Calculus		U N Dhar Pvt. Ltd
Das and Mukherjee	Differential Calculus		U N Dhar Pvt. Ltd

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 11**	**10**	**10**				
B	**1 to 11**			**5**	**3**	**5**	**60**
C	**1 to 11**			**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**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject: Introduction to Networking Protocols**	
Course Code: BITBC105	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 1	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 4	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
1.	A rigorous course covering the principles, standards, and practices of data communications protocols.
2.	With emphasis on the TCP/IP protocol suite. The topics will include: reference model, Network Access layer protocols.
3.	Aim to learn about Internet layer protocols, Transport layer protocols, and Application layer protocols.
Objective:	
Sl. No.	

1.	Understand the common networking standards, services, & protocols
2.	To know about the OSI and TCP models of network communication
3.	Explore routing & switching concepts
4.	Commonly used network hardware- Network media and topologies
5.	Gather network security concepts
6.	Understand network management
7.	Idea about sub-netting & VLANs

Pre-Requisite:	
Sl. No.	
1.	• **Basic JAVA Programming** • **Digital and Analog communication**

Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Principles of Communications** • Communication Protocols • Why Protocols Matter • The Internet and Standards • Network Standards Organizations • Stacking Them Up • Using a Layered Model • Different Types of Network Models • Dividing the Tasks • Comparing the OSI and TCP Models • Why Ethernet? • Ethernet is Constantly Evolving • Ethernet Addressing	**9**	**17**
02	**Network Design and Addressing** • Encapsulation • Framing the Message • Why Networks Need Hierarchical Design • Benefits of a Hierarchical Design • Physical & Logical Addresses • Access, Distribution and Core • Access Layer Devices • Ethernet Hubs • Ethernet Switches • MAC Address Tables • What are Broadcasts Anyway? • Broadcast Domains • Communicating at the Access Layer • How ARP Works	**9**	**18**
03	**Communicating on the Local Area Network** • Dividing the Local Network • Now We Need Routing	**9**	**17**

	• Selecting a Path • Building the Tables • How Routers Use Tables • Sending to Remote Networks • Local Area Networks • Assigning Hosts to a LAN		
04	**The Internet Protocol (IP)** • What is an IPv4 Address? • IPv4 Addressing • Binary to Decimal • Optional Activity - The Binary Game • Networks and Hosts • Logical AND • Are You on My Network? • Subnet Masks • Classful and Classless Addressing • Private IPv4 Addressing • Assignment of IPv4 Addresses • Unicast Transmission • Broadcast Transmission • Multicast Transmission	**9**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
W. Stallings	Data and Computer Communications	8th Ed. ISBN 0132433109.	by, Pearson Prentice-Hall.
Reference Books:			
Jeanna Matthews	Computer Networking: Internet Protocols in Action	Pap/Cdr edition, 978-0471661863	John Wiley & Sons
Chris Sanders	Practical Packet Analysis: Using Wireshark to Solve Real-World Network Problems	3rd Edition, ISBN-13: 9781593272661	No Starch Press
Kevin R. Fall, W. Richard Stevens	TCP/IP Illustrated: Volume 1: The Protocols	ISBN-13: 9780321336316	Addison-Wesley Professional

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	1,2,3,4,5	10	10				

B C	3, 4, 5 1,2,3,4,5			5 5	3 3	5 15	60

- 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

SEMESTER II

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Data Structure and Algorithm with Python and Data Structure and Algorithm with Python Lab	
Course Code: BITBC201 and BITBC291	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks:**200
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam:70
Tutorial: 0	Attendance: 5
Practical: 4	Continuous Assessment: 25
Credit: 3+2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1.	The point of this course is to give you a vibe for algorithms and data structures as a focal area of what it is to be a computer science student.
2.	You ought to know about the way that there are regularly a few calculations for some issue, and one calculation might be superior to another, or one calculation better in certain conditions and another better in others.
3.	You should have some idea of how to work out the efficiency of an algorithm.
4.	You will be able to use and design linked data structures
5.	You will learn why it is good programming style to hide the details of a data structure within an abstract data type.
6.	You should have some idea of how to implement various algorithm using python programming.
Objective:	
Sl. No.	
1.	To impart the basic concepts of data structures and algorithms.
2.	To understand concepts about searching and sorting techniques.
3.	To understand basic concepts about stacks, queues, lists, trees and graphs.

4.	To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures		
Pre-Requisite:			
Sl. No.			
1.	Basics of programming language.		
1.	Logic building skills.		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Data Structure** Abstract Data Type.	**1**	**2**
02	**Arrays** 1D, 2D and Multi-dimensional Arrays, Sparse Matrices. Polynomial representation.	**3**	**4**
03	**Linked Lists** Singly, Doubly and Circular Lists, Normal and Circular representation of Self Organizing Lists, Skip Lists, Polynomial representation.	**4**	**7**
04	**Stacks** Implementing single / multiple stack/s in an Array, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another, Applications of stack, Limitations of Array representation of stack.	**4**	**10**
05	**Queues** Array and Linked representation of Queue, Circular Queue, De-queue, Priority Queues.	**4**	**7**
06	**Recursion** Developing Recursive Definition of Simple Problems and their implementation, Advantages and Limitations of Recursion, Understanding what goes behind Recursion (Internal Stack Implementation)	**4**	**5**
07	**Trees** Introduction to Tree as a data structure, Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals of Binary Search Trees), Threaded Binary Trees (Insertion, Deletion, Traversals), Height-Balanced Trees (Various operations on AVL Trees).	**5**	**15**
08	**Searching and Sorting** Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Merge Sort, Quick sort, Shell Sort, Comparison of Sorting Techniques	**6**	**15**
09	**Hashing** Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering, Resolving collision by	**5**	**5**

	Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing, Choosing a Hash Function, Perfect Hashing Function.		
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

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

List of Practical:

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

Assignments:

Based on the curriculum as covered by subject teacher.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Michael H. Goldwasser, Michael T. Goodrich, and Roberto Tamassia	Data Structures and Algorithms in Python	1118476735, 9781118476734	John Wiley & Sons
Rance D Necaise	Data Structures and Algorithms Using Python	9788126562169	John Wiley & Sons

Reference Books:

Sartaj Sahni	DataStructures, Algorithms and applications in C++	Second Edition	Universities Press

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer with moderate configuration
1.	Python 2.7 or higher and other softwares as required.

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**				
				5	**3**	**5**	**60**
B	**1 to 9**						
				5	**3**	**15**	
C	**1 to 9**						

- 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:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Note Book	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology)
Subject: Computer Networks and Computer Networks Lab

Course Code: BITBC202 and BITBC292	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**

Tutorial: 0	**Attendance: 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	To gain knowledge of computer networks.
2.	To gain knowledge of several layers and network architectures
3.	To gain knowledge of communication through networks, protocols and alghorithms.

Objective:

Sl. No.	
1.	Understand the division of network functionalities into layers.
2.	Be familiar with the components required to build different types of networks Be exposed to the required functionality at each layer
3.	Learn the flow control and congestion control algorithms

Pre-Requisite:

Sl. No.	
1.	Understanding of algorithms
2.	Understanding of basic computer architecture

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**FUNDAMENTALS & LINK LAYER** Building a network – Requirements – Layering and protocols – Internet Architecture – Network software – Performance ; Link layer Services – Framing – Error Detection – Flow control	**7**	**14**
02	**MEDIA ACCESS & INTERNETWORKING** Media access control – Ethernet (802.3) – Wireless LANs – 802.11 – Bluetooth – Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP,ICMP)	**7**	**14**
03	**ROUTING** Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM)	**7**	**14**
04	**TRANSPORT LAYER** Overview of Transport layer – UDP – Reliable byte stream (TCP) – Connection management – Flow control – Retransmission – TCP Congestion control – Congestion avoidance (DECbit, RED) – QoS – Application requirements	**8**	**14**
05	**APPLICATION LAYER** Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP	**7**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1. Identify the components required to build different types of networks
2. Choose the required functionality at each layer for given application
3. Identify solution for each functionality at each layer
4. Trace the flow of information from one node to another node in the network

List of Practical: Based on theory lectures.
Assignments:
Adhered to theory curriculum as conducted by the subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Larry L. Peterson, Bruce S. Davie	Computer Networks: A Systems Approach	Fifth	Morgan Kaufmann Publishers
Behrouz A. Forouzan	Data Communication and Networking	Fourth	Tata McGraw – Hill
James F. Kurose, Keith W. Ross	Computer Networking – A Top-Down Approach Featuring the Internet	Fifth	Pearson Education
Reference Books:			
Nader. F. Mir	Computer and Communication Networks		Pearson Prentice Hall Publishers
Ying-Dar Lin, Ren-Hung Hwang, Fred Baker	Computer Networks: An Open Source Approach		McGraw Hill Publisher

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer with Internet Connection

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 questions (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:

Continuous evaluation			**40**
External Examination: Examiner-			
Signed Lab Assignments		**10**	
On Spot Experiment		**40**	
Viva voce		**10**	**60**

Name of the Course: BSc. in Information Technology (Blockchain Technology) **Subject:** Data Acquisition & Processing			
Course Code: BITBC203		**Semester: II**	
Duration: 36		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		End Semester Exam: 70	
Tutorial: 1		Attendance: 5	
Practical: 0		Continuous Assessment:25	
Credit: 4		Practical Sessional internal continuous evaluation: NA	
		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	Understand the principles of operation and limitations of common measuring instruments.		
2.	Model instruments and their operating conditions to use the instruments correctly.		
3.	Design systems for the acquisition, analysis, and communication of data		
4.	Gain awareness of economical and societal aspects of instrumentation systems and communication of data.		
Objective:			
Sl. No.			
1.	To understand concepts of acquiring the data from transducers/input devices, their interfacing and instrumentation system design.		
2.	To familiarize with different data transfer techniques.		
3.	To automate the acquisition and processing of data.		
Pre-Requisite:			
Sl. No.			
1.	Electrical and Electronics subject knowledge		
2.	Mathematical knowledge		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Sensors**: temperature, light, displacement, acceleration, pressure, flow, mechanical strain.	4	**5**

02	**Data acquisition**: pre-processing and filtering, impedance matching, band pass of the measurement system.	4	10
03	**AD/DA converters**: AD and DA techniques, data acquisition systems, convertor properties, the selection and use of ADC.	4	**5**
04	**Basics of microcontrollers***:* properties, block diagram, input and output units, timing units, other peripheral units.	4	**10**
05	**Personal computer***:* sound card, RS232, RS422, GPIB, PCI, USB.	4	**10**
06	**Acquisition**: sampling, Nyquist criteria, frequency aliasing.	4	10
07	**Basics of digital data processing***:* FFT, digital filtering, convolution, FIR, IIR.	4	5
08	**Applications in data processing**: modulation and demodulation (AM, FM, PM), measurement (amplitude, phase, frequency, period), oscillators.	4	5
09	**Basics of programmable logic circuits:** CPLD and PFHA architecture, examples of the use, basics of programming language VHDL.	4	10
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
S.W. Smith	The Scientist and Engineer's Guide to Digital Signal processing		California Technical Publishing

Reference Books:

W.J. Thompson, J.G. Webster	Interfacing Sensors to the IBM PC		Prentice Hall
A. Bateman, I. Paterson-Stephens	The DSP Handbook		Prentice Hall

List of equipment/apparatus for laboratory experiments:

Sl. No.	**Sensor, DAQ Device**
1.	**Computer**
2.	**Softwires**

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 9** **1 to 9** **1 to 9**	**10**	**10**	 **5** **5**	 **3** **3**	 **5** **15**	**60**

- 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**	**3**	**3**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject: Discrete Mathematics**	
Course Code: BITBC204	**Semester: II**
Duration: 36 Hrs	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial:1	Attendance: 5
Practical:0	Continuous Assessment: 25
Credit:4	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:			
Sl. No.			
1.	**Knowledge of basic algebra**		
2.	**Ability to follow logical arguments.**		
Contents		**4 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.	**7**	**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.	**8**	**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.)	**7**	**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).	**6**	**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,	**8**	**18**

	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:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

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

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Kenneth H. Rosen	Discrete Mathematics and its Applications		Tata Mc.Graw Hill
eymourLipschutz, 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**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject: Environmental Science**			
Course Code: BITBC205		**Semester: II**	
Duration: 36 Hrs		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 1		End Semester Exam: 70	
Tutorial: 0		Attendance: 5	
Practical: 0		Continuous Assessment: 25	
Credit: 1		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**		
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		
Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction** Basic ideas of environment, basic concepts, man, society &amp, environment, their interrelationship. Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non- renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development. Materials balance: Steady state conservation system, steady state system with non-conservative pollutants, step function. Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management, Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering.	**3**	**5**
02	**Ecology**	**7**	**10**

	Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem-components types and function. Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban), Food chain [definition and one example of each food chain], Food web. Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity.		
03	**Air pollution and control** Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere,Tropopause and Mesopause. Energy balance:Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems.Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food.Global warming and its consequence, Control of Global warming. Earth's heat budget. Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model. Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green house gases, effect of ozone modification. Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference).	**6**	**10**
04	**Water Pollution and Control** Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. River/Lake/ground water pollution: River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river[deoxygenation, reaeration], COD, Oil, Greases, pH. Lake: Eutrophication [Definition, source and effect]. Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only) Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening] Wastewater treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment	**6**	**15**

	definition. Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic.		
05	**Land Pollution** Lithosphere, Internal structure of earth, rock and soil 1L Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes, Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste).	**4**	**10**
06	**Noise Pollution** Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise] Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level,(18hr Index), Ldn. Noise pollution control.	**5**	**10**
07	**Environmental Management** Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.	**5**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
G. M.Masters,	Introduction to Environmental Engineering and Science		Prentice-Hall of India Pvt. Ltd., 1991
Reference Books:			
A. K. De	Environmental Chemistry		New Age 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**

Name of the Course: B.Sc. in Information Technology (**Blockchain Technology**) **Subject:** Project I	
Course Code: BITBC281	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 0	**End Semester Exam: 100**
Tutorial: 0	**Attendance: 5**
Practical: 2	**Continuous Assessment: 0**
Credit: 1	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60
Contents	
Students will do projects on application areas of latest technologies and current topics of societal relevance.	

SEMESTER III

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Data Privacy & Security and Data Privacy & Security Lab	
Course Code: BITBC301 and BITBC391	**Semester: III**
Duration: 36 Hrs.	**Maximum Marks: 200**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination:60

Aim:

Sl. No.	
1.	Highlight several current attack vectors and the associated mitigating behaviour.
2.	Explain how employees can internally determine risk level of their actions while using the Internet.
3.	Explain how current threats to foreign adversaries, eg. Flame, could be adapted to assault US infrastructures, or could backfire causing domestic damage.
4.	Re-iterate the key points from the annual required computer security awareness training provided by corporate, tying in points from that training to this module to form cohesion across the trainings.

Objective:

Sl. No.	
1.	Using the above attack vectors give real world, relatable scenarios, that the employees can identify in their own work days
2.	To understand Security policies.

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction** Fundamental Concepts, Definitions, Statistics, Data Privacy Attacks, Data linking and profiling, access control models, role based access control, privacy policies, their specifications, languages and implementation, privacy policy languages, privacy in different domains- medical, financial, etc.	**7**	**10**
02	**Data explosion** Statistics and Lack of barriers in Collection and Distribution of Person-specific information, Mathematical model for characterizing and comparing real-world data sharing practices and policies and for computing privacy and risk measurements, Demographics and Uniqueness.	**6**	**10**
03	**Protection Models** Null-map, k-map, Wrong map	**3**	**10**
04	**Survey of techniques**	**7**	**10**

	Protection models (null-map, k-map, wrong map), Disclosure control, Inferring entity identities, Strength and weaknesses of techniques, entry specific databases		
05	**Computation systems for protecting delimited data** MinGen, Datafly, Mu-Argus, k-Similar, Protecting textual documents: Scrub	**6**	**15**
06	**Technology, Policy, Privacy and Freedom** Medical privacy legislation, policies and best practices, Examination of privacy matters specific to the World Wide Web, Protections provided by the Freedom of Information Act or the requirement for search warrants.	**7**	**15**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:
Skills to be developed:
Intellectual skills:

1. Learn and apply different security aspects
2. Develop programming skills

List of Practical:
Based on test environment.
Assignments:
Based on theory lecture

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
B. Raghunathan	The Complete Book of Data Anonymization: From Planning to Implementation		Ch Pub, 2013.
Reference Books:			
. Sweeney	Computational Disclosure Control: A Primer on Data Privacy Protection		MIT Computer Science, 2002

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	**Computer**
2.	**Switch**
3.	**Test Server**

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	All All All	10	10	 5 5	 3 3	 5 15	60

- 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:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Note Book	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology)
Subject: Design and Analysis of Algorithms and Design and Analysis of Algorithms Lab

Course Code: BITBC302 and BITBC392	**Semester: III**
Duration: 36 Hrs.	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	To teach paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
2.	To make students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms.
3.	To explain different computational models (e.g., divide-and-conquer), order notation and various complexity measures (e.g., running time, disk space) to analyze the complexity/performance of different algorithms.

Objective:

Sl. No.	

1.	Analyze the asymptotic performance of algorithms.		
2.	Write rigorous correctness proofs for algorithms.		
3.	Demonstrate a familiarity with major algorithms and data structures.		
Pre-Requisite:			
Sl. No.			
1.	Basic Programming Knowlwdge		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**INTRODUCTION** Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis – Mathematical analysis for Recursive and Non-recursive algorithms – Visualization	**7**	**14**
02	**BRUTE FORCE AND DIVIDE-AND-CONQUER** Brute Force – Computing an – String Matching – Closest-Pair and Convex-Hull Problems – Exhaustive Search – Travelling Salesman Problem – Knapsack Problem – Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort – Heap Sort – Multiplication of Large Integers – Closest-Pair and Convex – Hull Problems	**7**	**14**
03	**DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE** Dynamic programming – Principle of optimality – Coin changing problem, Computing a Binomial Coefficient – Floyd‘s algorithm – Multi stage graph – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique – Container loading problem – Prim‘s algorithm and Kruskal’s Algorithm – 0/1 Knapsack problem, Optimal Merge pattern – Huffman Trees.	**7**	**14**
04	**ITERATIVE IMPROVEMENT** The Simplex Method – The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs, Stable marriage Problem.	**8**	**14**
05	**COPING WITH THE LIMITATIONS OF ALGORITHM POWER** Lower – Bound Arguments – P, NP NP- Complete and NP Hard Problems. Backtracking – n-Queen problem – Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search – Assignment problem – Knapsack Problem – Travelling Salesman Problem – Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.	**7**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**
Practical:			

Skills to be developed:

Intellectual skills:

1. Identify the components required to build different types of networks
2. Choose the required functionality at each layer for given application
3. Identify solution for each functionality at each layer
4. Trace the flow of information from one node to another node in the network

List of Practical: Based on theory lectures.

Assignments:

Adhered to theory curriculum as conducted by the subject teacher.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Anany Levitin	Introduction to the Design and Analysis of Algorithms	Third Edition	Pearson Education
Thomas H. Cormen,Charles E. Leiserson,Ronald L. Rivest,Clifford Stein	Introduction to Algorithms	III edition	The MIT Press
Reference Books:			
Steven S S. Skiena	The Algorithm Design Manual	2nd edition	Springer
Robert Sedgewick,Kevin Wayne	Algorithms	4th edition	Addison-Wesley Professional

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

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 questions (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:				
Continuous evaluation				**40**
External Examination: Examiner-				
Signed Lab Assignments			**10**	
On Spot Experiment			**40**	
Viva voce			**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** DBMS and SQL injection Attack and DBMS and SQL injection Attack Lab			
Course Code: BITBC303 and BITBC393		**Semester: III**	
Duration: 36 Hrs.		**Maximum Marks: 100 + 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		**End Semester Exam: 70**	
Tutorial: 0		**Attendance: 5**	
Practical: 4		**Continuous Assessment: 25**	
Credit: 3 + 2		**Practical Sessional internal continuous evaluation: 40**	
		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1.	Understand how SQL injection attacks work.		
2.	Learn how to recognize weaknesses related to SQL injections.		
3.	Learn how to mitigate them, especially the use of prepared statements		
Objective:			
Sl. No.			
1.	Understand database concepts and structures and query language		
2.	Understand the E R model and relational model		
3.	To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Database Management System Concepts**	**3**	**6**

	Introduction, Significance of Database, Database System Applications; Data Independence; Data Modeling for a Database; Entities and their Attributes, Entities, Attributes, Relationships and Relationships Types, Advantages and Disadvantages of Database Management System, DBMS Vs RDBMS		
02	**Database System Architecture** Three Level Architecture of DBMS, The External Level or Subschema, The Conceptual Level or Conceptual Schema, The Internal Level or Physical Schema, Mapping; MySQL Architecture; SQL Server 2000 Architecture; Oracle Architecture; Database Management System Facilities, Data Definition Language, Data Manipulation Language; Database Management System Structure, Database Manager, Database Administrator, Data Dictionary; Distributed Processing, Information and Communications Technology System (ICT), Client / Server Architecture	**3**	**6**
03	**Database Models and Implementation** Data Model and Types of Data Model, Relational Data Model, Hierarchical Model, Network Data Model, Object/Relational Model, Object-Oriented Model; Entity-Relationship Model, Modeling using E-R Diagrams, Notation used in E-R Model, Relationships and Relationship Types; Associative Database Model	**3**	**6**
04	**File Organization for Conventional DBMS** Storage Devices and its Characteristics, Magnetic Disks, Physical Characteristics of Disks, Performance Measures of Disks, Optimization of Disk-Block Access; File Organization, Fixed-Length Records, Variable-Length Records, Organization of records in files; Sequential file Organization; Indexed Sequential Access Method (ISAM); Virtual Storage Access Method (VSAM)	**4**	**7**
05	**An Introduction to RDBMS** An informal look at the relational model; Relational Database Management System; RDBMS Properties, The Entity-Relationship Model; Overview of Relational Query Optimization; System Catalog in a Relational DBMS, Information Stored in the System Catalog, How Catalogs are Stored	**3**	**6**
06	**SQL – 1** Categories of SQL Commands; Data Definition; Data Manipulation Statements, SELECT - The Basic Form, Subqueries, Functions, GROUP BY Feature, Updating the Database, Data Definition Facilities	**3**	**6**
07	**SQL – 2** Views; Embedded SQL *, Declaring Variables and Exceptions, Embedding SQL Statements; Transaction Processing, Consistency and Isolation, Atomicity and Durability	**3**	**7**
08	**Relational Algebra**	**3**	**7**

	Basic Operations, Union (U), Difference (-), Intersection (), Cartesian Product (x); Additional Relational Algebraic Operations, Projection (), Selection (), JOIN ( ), Division ()		
09	**Relational Calculus** Tuple Relational Calculus, Semantics of TRC Queries, Examples of TRC Queries; Domain Relational Calculus; Relational ALGEBRA vs Relational CALCULUS	**3**	**6**
10	**Normalization** Functional Dependency; Anomalies in a Database; Properties of Normalized Relations; First Normalization; Second Normal Form Relation; Third Normal Form; Boyce-Codd Normal Form (BNCF); Fourth and Fifth Normal Form	**4**	**7**
11	**SQL Injection** Introduction to Injection Attacks; Data Store Injection; Introduction to XML, JavaScript and SQL injection attacks; Different Statement Injection; UNION Operator; Database Fingerprinting	**4**	**6**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1. Apply various Normalization techniques
2. Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers
3. Execute various advance SQL queries related to Transaction Processing & Locking using concept of Concurrency control.
4. Understand query processing and techniques involved in query optimization.
5. Understand the principles of storage structure and recovery management.

List of Practical: Based on theory lectures.

Assignments:

Adhered to theory curriculum as conducted by the subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
A.Silberschatz, H.F. Korth, S.Sudarshan	Database System Concepts	6th Edition	McGraw Hill
Raghurama Krishnan, Johannes Gehrke	Database Management Systems	III edition	McGrawHill Education
Reference Books:			
Bipin C. Desai	Introduction to Database Systems	11th edition	West Group

Hector Garcia-Molina,Jeffrey D. Ullman, Jennifer Widom	Database Systems: The Complete Book	2nd edition	Pearson

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

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 questions (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:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology)

Subject: Introduction to Operating System

Course Code: BITBC304	**Semester: IV**

Duration: 36	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial: 1	Attendance: 5
Practical: 0	Continuous Assessment:25
Credit: 4	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA

Aim:

Sl. No.	
1.	General understanding of structure of modern computers
2.	Purpose, structure and functions of operating systems
3.	Illustration of key OS aspects by example

Objective:

Sl. No.	
1.	To learn the fundamentals of Operating Systems.
2.	To learn the mechanisms of OS to handle processes and threads and their communication
3.	To learn the mechanisms involved in memory management in contemporary OS
4.	To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5.	To know the components and management aspects of concurrency management

Pre-Requisite:

Sl. No.	
1.	Computer architecture
2.	Elementary data structures and algorithms

Contents	**Hrs./week**

Chapter	Name of the Topic	Hours	Marks
01	**Introduction** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.	**3**	**5**
02	**Processes** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.	**8**	**20**
03	**Inter-process Communication:** Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.	**4**	**5**
04	**Deadlocks** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	**4**	**10**
05	**Memory Management** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance	**8**	**10**

	(SC), Not recently used (NRU) and Least Recently used (LRU).		
06	**I/O Hardware** I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.	**6**	**10**
07	**Disk Management** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.	**3**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Assignments:

Based on the curriculum as covered by subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia	Operating System Concepts Essentials	978-1-119-32091-3	
William Stallings	Operating Systems: Internals and Design Principles	5th Edition	Prentice Hall of India

Reference Books:

Charles Crowley	Operating System: A Design-oriented Approach	1st Edition	Irwin Publishing
J. Nutt, Addison- Wesley	Operating Systems: A Modern Perspective	2nd Edition	
Maurice Bach	Design of the Unix Operating Systems	8th Edition	Prentice-Hall of India
Daniel P. Bovet, Marco Cesati	Understanding the Linux Kernel	3rd Edition	O'Reilly and Associates

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	**Computer**
2.	**Linux/Ubantu operating system**

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 7** **1 to 7** **1 to 7**	**10**	**10**	**5** **5**	**3** **3**	**5** **15**	**60**

- 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**	**3**	**3**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Value & Ethics in Data Science	
Course Code: BITBC305	**Semester: III**
Duration: 36	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial: 1	Attendance: 5
Practical:0	Continuous Assessment:25
Credit: 4	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
1.	**To understand the ethics in data science**

Objective:	
Sl. No.	
1.	Students will learn key philosophical concepts related to responsible conduct of research.
2.	Students will develop familiarity with current debates in, and case studies of, ethical issues in non-medical scientific research.

3.	Students will acquire skills to describe and explain the rationale behind philosophical ethical positions.		
Pre-Requisite:			
Sl. No.			
1	**Knowledge of Analysis**		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**HUMAN VALUES** Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.	**6**	**10**
02	**ENGINEERING ETHICS** Senses of „Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories	**8**	**10**
03	**ENGINEERING AS SOCIAL EXPERIMENTATION** Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.	**8**	**15**
04	**SAFETY, RESPONSIBILITIES AND RIGHTS** Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination	**8**	**15**
05	**GLOBAL ISSUES** Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert	**6**	**10**

	Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility		
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
W. Martin and Roland Schinzinger	Ethics in Engineering		Tata McGraw Hill
Govindarajan M, Natarajan S, Senthil Kumar V. S	Engineering Ethics		Prentice Hall of India
Charles B. Fleddermann	Engineering Ethics		Pearson Prentice Hall
Laura P. Hartman and Joe Desjardins	Business Ethics: Decision Making for Personal Integrity and Social Responsibility		Mc Graw Hill education
Reference Books:			
Charles E. Harris, Michael S. Pritchard and Michael J. Rabins	Engineering Ethics – Concepts and Cases		Cengage Learning
John R Boatright	Ethics and the Conduct of Business		Pearson Education
Edmund G Seebauer and Robert L Barry	Fundamentals of Ethics for Scientists and Engineers		Oxford University Press

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 5** **1 to 5** **1 to 5**	**10**	**10**	**5** **5**	**3** **3**	**5** **15**	**60**

- 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**	**3**	**3**

SEMESTER IV

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Secure Software Design & Enterprise Computing and Secure Software Design & Enterprise Computing Lab	
Course Code: BITBC401 and BITBC491	**Semester: IV**
Duration: 36 Hrs.	**Maximum Marks: 100 + 100**

Teaching Scheme	Examination Scheme
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1.	The course takes a software development perspective to the challenges of engineering software systems that are secure.
2.	This course addresses design and implementation issues critical to producing secure software systems.
3.	The course deals with the question of how to make the requirements for confidentiality, integrity, and availability integral to the software development process from requirements gathering to design, development, configuration, deployment, and ongoing maintenance

Objective:	
Sl. No.	
1.	Understand various aspects and principles of software security.
2.	Devise security models for implementing at the design level
3.	Identify and analyze the risks associated with s/w engineering and use relevant models to mitigate the risks.
4.	Understand the various security algorithms to implement for secured computing and computer networks.
5.	Explain different security frameworks for different types of systems including electronic systems.

Pre-Requisites	
	Software Engineering Fundamentals

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Defining computer security, the principles of secure software, trusted computing base, etc, threat modelling, advanced techniques for mapping security requirements into design specifications. Secure software implementation, deployment and ongoing management.	**7**	**14**
02	Software design and an introduction to hierarchical design representations. Difference between high-level and detailed design. Handling security with high-level design. General Design Notions. Security concerns designs at multiple levels of abstraction, Design patterns, quality assurance activities and strategies that support early vulnerability detection, Trust models, security Architecture & design reviews.	**7**	**14**
03	Software Assurance Model: Identify project security risks & selecting risk management strategies, Risk Management Framework, Security	**7**	**14**

	Best practices/ Known Security Flaws, Architectural risk analysis, Security Testing & Reliability (Penn testing, Risk- Based Security Testing, Abuse Cases, Operational testing , Introduction to reliability engineering, software reliability, Software Reliability approaches, Software reliability modelling.		
04	Software Security in Enterprise Business: Identification and authentication, Enterprise Information Security, Symmetric and asymmetric cryptography, including public key cryptography, data encryption standard (DES), advanced encryption standard (AES), algorithms for hashes and message digests. Authentication, authentication schemes, access control models, Kerberos protocol, public key infrastructure (PKI), protocols specially designed for e-commerce and web applications, firewalls and VPNs. Management issues, technologies, and systems related to information security management at enterprises.	**8**	**14**
05	Security development frameworks. Security issues associated with the development and deployment of information systems, including Internet-based e-commerce, e-business, and e-service systems, as well as the technologies required to develop secure information systems for enterprises, policies and regulations essential to the security of enterprise information systems.	**7**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1. To identify the various requirement development activities viz. elicitation, analysis, specification and verification for the given scenarios.
2. To identify the role of the software in today's world across a few significant domains related to day to day life
3. To identify the suitable software development model for the given scenario

List of Practical: Based on theory lectures.

Assignments:

Adhered to theory curriculum as conducted by the subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
W. Stallings	Cryptography and network security: Principles and practice	Fifth	Upper Saddle River, NJ: Prentice Hall

C. Kaufman, r. Perlman, & M. Speciner	Network security: Private communication in a public world	Second	Upper Saddle River, NJ:Prentice HalL
C. P. Pfleeger, S. L. Pfleeger	Security in Computing	Fourth	Upper Saddle River, NJ:Prentice Hall
Reference Books:			
Gary McGraw	Software Security: Building Security		Addison-Wesley
M. Merkow, & J. Breithaupt	Information security: Principles and practices.		Upper Saddle River, NJ:Prentice Hall

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

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 questions (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:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Ethical hacking in Linux Environment and Ethical hacking in Linux Environment Lab	
Course Code: BITBC402 and BITBC492	**Semester: IV**
Duration: 36 Hrs.	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1.	To learn how to penetrate networks, exploit systems, break into computers, and compromise routers?
2.	To use the valuable skills to work for companies that want you to use these skills to test their network security and show them to enhance it.
3.	To apply these skills to what you already know to greatly advance your career as a network specialist, network administrator, or freelancer online

Objective:	
Sl. No.	
1.	Understand how to install VirtualBox.
2.	To be able to recover and analyze archives and .rar files used by APT-like attackers to exfiltrate sensitive data from the enterprise network
3.	To know how to create the virtual environment. Installing VirtualBox in a Windows 8.1 environment.
4.	Basic Linux terminal knowledge, Staying anonymous with tor. To be introduced with Virtual Private Networks (VPN).

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Ethical Hacking** Introduction to ethical hacking. What is it in detail? Prerequisites for getting the most out of this course. Basic terminology white hat, gray hat, and black hat hacking Basic terminology SQL injections, VPN, proxy, VPS, and keyloggers	**12**	**23**
02	**Build your hacking environment!** Updated Kali Linux installation guide Installing VirtualBox with RPM and why use a virtual machine	**12**	**24**

	Installing VirtualBox using the default package manager from repositories Creating the virtual environment Installating VirtualBox on Windows Kali Linux installation within a virtual environment Booting up Kali Linux for the first time		
03	**Linux CLI** Introduction to the Linux terminal Linux command line interface (CLI) basics Linux CLI explained in greater detail	**12**	**23**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1. Installing VirtualBox with RPM and why use a virtual machine
2. Installing VirtualBox using the default package manager from repositories
3. Creating the virtual environment
4. Installating VirtualBox on Windows
5. Kali Linux installation within a virtual environment
6. Booting up Kali Linux for the first time

List of Practical: Based on theory lectures.

Assignments:

Adhered to theory curriculum as conducted by the subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Robert W. Beggs	Mastering Kali Linux for Advanced Penetration Testing	ISBN: 1782163123	Packt Publishing (June 24, 2014)
Daniel W. Dieterle	Basic Security Testing with Kali Linux 2	ISBN: 1530506565	CreateSpace Independent Publishing Platform (March 24, 2016)
Reference Books:			
Vivek Ramachandran, Cameron Buchanan	Kali Linux Wireless Penetration Testing: Beginner's Guide: Learn to penetrate Wi-Fi and wireless networks to secure your system from vulnerabilities	2nd Edition. ISBN: 1783280417	Packt Publishing

List of equipment/apparatus for laboratory experiments:							
Sl. No.							
1.		Computer					
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 5** **1 to 5** **1 to 5**	**10**	**10**	**5** **5**	**3** **3**	**5** **15**	**60**

- Only multiple choice type questions (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:			
Continuous evaluation			**40**
External Examination: Examiner-			
Signed Lab Assignments		**10**	
On Spot Experiment		**40**	
Viva voce		**10**	**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Intrusion Detection and Prevention	
Course Code: BITBC403	**Semester: IV**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 1	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**

Credit: 4		**Practical Sessional internal continuous evaluation: NA**	
		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	Introduce students to need for Intrusion Detection Systems.		
2.	Introduce students to different techniques for Intrusion Detection.		
3.	Enable students to use various tools for Intrusion Detection Mechanisms.		
Objective:			
Sl. No.			
1.	Realize the research aspects in the field of intrusion detection systems.		
2.	Optimize performance of detection systems by employing various machine learning techniques.		
3.	Apply knowledge of machine learning in system and network protection.		
Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**INTRODUCTION:** Understanding Intrusion Detection – Intrusion detection and prevention basics – IDS and IPS analysis schemes, Attacks, Detection approaches –Misuse detection – anomaly detection – specification based detection – hybrid detection THEORETICAL FOUNDATIONS OF DETECTION: Taxonomy of anomaly detection system – fuzzy logic – Bayes theorem – Artificial Neural networks – Support vector machine – Evolutionary computation – Association rules – Clustering	**7**	**14**
02	**ARCHITECTURE AND IMPLEMENTATION:** Centralized – Distributed – Cooperative Intrusion Detection – Tiered architecture	**7**	**14**
03	**JUSTIFYING INTRUSION DETECTION:** Intrusion detection in security – Threat Briefing –Quantifying risk – Return on Investment (ROI)	**8**	**14**
04	**APPLICATIONS AND TOOLS:** Tool Selection and Acquisition Process – Bro Intrusion Detection – Prelude Intrusion Detection – Cisco Security IDS – Snorts Intrusion Detection – NFR security	**7**	**14**
05	**LEGAL ISSUES AND ORGANIZATIONS STANDARDS:** Law Enforcement / Criminal Prosecutions – Standard of Due Care – Evidentiary Issues, Organizations and Standardizations.	**7**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

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

Rafeeq Rehman	Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID	First	Prentice Hall
Carl Enrolf, Eugene Schultz, Jim Mellander	Intrusion detection and Prevention		McGraw Hill
Earl Carter, Jonathan Hogue	Intrusion Prevention Fundamentals		Pearson Education
Reference Books:			
Ali A. Ghorbani, Wei Lu	Network Intrusion Detection and Prevention: Concepts and Techniques		Springer
Paul E. Proctor	The Practical Intrusion Detection Handbook		Prentice Hall
Ankit Fadia and Mnu Zacharia	Intrusiion Alert		Vikas Publishing house Pvt

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 questions (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: B.Sc. in Information Technology (Blockchain Technology)	
Subject: Cyber Security Vulnerabilities & Cyber Security Safeguards	
Course Code: BITBC404	**Semester: IV**

Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 1	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 4	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
1.	To learn foundations of Cyber Security and Ethical Hacking analysis using programming languages like python.
2.	To learn various types of algorithms and its applications of Cyber Security and Ethical Hacking using forensic detection
3.	To learn python toolkit for required for programming Cyber Security, Ethical Hacking concepts
4.	To understand the concepts of Cyber Security, Ethical Hacking Forensic detection image processing, pattern recognition, and natural language processing.

Objective:	
Sl. No.	
1.	Understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.
2.	Identify & Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time
3.	Identify common trade-offs and compromises that are made in the design and development process of Information
4.	Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection.

Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Cyber Security** Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.	**7**	**10**
02	**Cyber Security Vulnerabilities and Cyber Security Safeguards** Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management	**5**	**10**

03	**Securing Web Application, Services and Servers** Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.	**5**	**10**
04	**Intrusion Detection and Prevention** Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.	**6**	**10**
05	**Cryptography and Network Security** Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls-Types of Firewalls, User Management, VPN Security Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.	**5**	**10**
06	**Cyberspace and the Law** Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.	**5**	**10**
07	**Cyber Forensics** Introduction to Cyber Forensics, Handling Preliminary Investigations, Controlling an Investigation, Conducting disk-based analysis, Investigating Information-hiding, Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time.	**3**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Erdal Ozkaya, Milad Aslaner	Hands-On Cybersecurity for Finance: Identify vulnerabilities and secure your financial services from security breaches	1 edition	Packt Publishing

Lester Evans	Cybersecurity: An Essential Guide to Computer and Cyber Security for Beginners, Including Ethical Hacking, Risk Assessment, Social Engineering, Attack and Defense Strategies, and Cyberwarfare	**ISBN-10:** 1791553583 **ISBN-13:** 978-1791553586	Independently published
Reference Books:			
Edward G. Amoroso, Matthew E. Amoroso	From CIA to APT: An Introduction to Cyber Security	**ISBN-10:** 1522074945 **ISBN-13:** 978-1522074946	Independently published
Brian Walker	Cyber Security: Comprehensive Beginners Guide to Learn the Basics and Effective Methods of Cyber Security	ISBN-10: 1075257670 ISBN-13: 978-1075257674	Independently published

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 questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Access Control & OS Security			
Course Code: BITBC405		**Semester: III**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		**End Semester Exam: 70**	
Tutorial: 1		**Attendance: 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit: 4		**Practical Sessional internal continuous evaluation: NA**	
		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	To gain knowledge of OS Security.		
2.	To gain knowledge of several Access Control layers and network architectures		
3.	To gain knowledge of communication through networks, protocols.		
Objective:			
Sl. No.			
1.	Understand the division of Access Control functionalities into operating system.		
2.	Be familiar with the components required to multilayer security.		
3.	Learn to manage Current Privacy Issues of a system.		
Pre-Requisite:			
Sl. No.			
1.	Understanding of Operating System		
Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Access Control** Introduction , Operating System Access Controls , Groups and Roles , Access Control Lists , Unix Operating System Security , Apple's OS/X , Windows—Basic Architecture , Capabilities , Windows—Added Features Middleware , Database Access Controls , General Middleware Issues , ORBs and Policy Languages , Sandboxing and Proof-Carrying Code , Virtualization, Trusted Computing.	**7**	**14**
02	**Multilevel Security** Introduction , Security Policy Model, The Bell-LaPadula Security Policy Model , Classifications and Clearances , Information Flow Control, The Standard Criticisms of Bell-LaPadula , Alternative Formulations	**7**	**14**

	The Biba Model and Vista , Historical Examples of MLS Systems , SCOMP , Blacker MLS Unix and Compartmented Mode Workstations , The NRL Pump , Logistics Systems, Sybard Suite , Wiretap Systems Future MLS Systems , Vista , Linux , Virtualization , Embedded Systems , Composability.		
03	**Multilateral Security** Introduction, Compartmentation, the ChineseWall and the BMA Model Compartmentation and the Lattice Model , The Chinese Wall , The BMA Model , The Threat Model , The Security Policy , Pilot Implementations Current Privacy Issues , Inference Control , Basic Problems of Inference Control in Medicine , Other Applications of Inference Control , The Theory of Inference Control , Query Set Size Control , Trackers , More Sophisticated Query Controls , Cell Suppression , Maximum Order Control and the Lattice Model, Audit Based Control, Randomization , Limitations of Generic Approaches , Active Attacks , The Value of Imperfect Protection , The Residual Problem	**7**	**14**
04	**Emission Security** Introduction , Technical Surveillance and Countermeasures , Passive Attacks Leakage Through Power and Signal Cables , Red/Black Separation , Timing Analysis . Power Analysis , Leakage Through RF Signals , Active Attacks, Tempest Viruses , Nonstop , Glitching , Differential Fault Analysis , Combination Attacks , Commercial Exploitation , Defenses , Optical, Acoustic and Thermal Side Channels .	**8**	**14**
05	**System Evaluation and Assurance** Introduction, Assurance , Perverse Economic Incentives , Project Assurance , Security Testing , Formal Methods , QuisCustodiet , Process Assurance, Assurance Growth , Evolution and Security Assurance Evaluation Evaluations by the Relying Party , The Common Criteria , Ways Forward , Hostile Review.	**7**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Ross Anderson	Security Engineering	Second	Wiley
Reference Books:			
Trent Jaeger	Operating System Security	ISBN 9781598292121	Morgan & Claypool Publishers

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 questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Project II	
Course Code: BITBC481	**Semester: IV**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 0	**End Semester Exam: 100**
Tutorial: 0	**Attendance: 5**
Practical: 4	**Continuous Assessment: 0**
Credit: 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60
Contents	
Students will do projects on application areas of latest technologies and current topics of societal relevance.	

SEMESTER: V

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Blockchain and Crypto currency and Bitcoin Wallet and Mining Software Lab	
Course Code: BITBC501 and BITBC591	**Semester: V**
Duration: 36 Hrs.	**Maximum Marks: 200**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**

Tutorial: 0	**Attendance: 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3+2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	Explain cryptographic building blocks and reason about their security
2.	Define Bitcoin's consensus mechanism
3.	Learn how the individual components of the Bitcoin protocol make the whole system works: transactions, script, blocks, and the peer-to-peer network
4.	Define how mining can be re-designed in alternative cryptocurrencies

Objective:

Sl. No.	
1.	To learn Blockchain systems: Nuts and Bolts
2.	Able to analyse Decentralized systems
3.	To understand Tokenization and ICOs
4.	To describe Cryptography of Blockchain

Pre-Requisite:

Sl. No.	
1.	Database System
2.	Cryptography
3.	Basic Financial Knowledge

Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**INTRODUCTION** Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Why Nakamoto Came up with Blockchain based cryptocurrency? Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.	**6**	**10**
02	**Basic Distributed Computing** Atomic Broadcast, Consensus, Byzantine Models of fault tolerance	**6**	**10**
03	**Basic Crypto primitives** Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems	**6**	**15**
04	**Blockchain 1.0** Bitcoin blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use	**6**	**10**
05	**Blockchain 2.0** Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts	**3**	**5**

06	**Blockchain 3.0** Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain	**3**	**10**
07	**Privacy, Security issues in Blockchain** Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – such as Sybil attacks, selfish mining, 51% attacks - -advent of algorand, and Sharding based consensus algorithms to prevent these	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:
Skills to be developed:
Intellectual skills:

1. Define Bitcoin's consensus mechanism
2. Learn how the individual components of the Bitcoin protocol make the whole system works: transactions, script, blocks, and the peer-to-peer network
3. Define how mining can be re-designed in alternative cryptocurrencies

List of Practical:
Based on theory lectures.
Assignments:
Based on theory lectures.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Don Tapscott , Alex Tapscott	Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies Is Changing the World Paperback		
Reference Books:			
William Mougayar	The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology		Wiley

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 **C**	**1 to 6** **1 to 6**			**5** **5**	**3** **3**	**5** **15**	**60**

- Only multiple choice type questions (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:			
Continuous evaluation			**40**
External Examination: Examiner-			
Signed Lab Note Book	**10**		
On Spot Experiment	**40**		
Viva voce	**10**		**60**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Human Computer Interaction	
Course Code: BITBC502A	**Semester: V**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 3	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
1.	Be familiar with the capabilities of various computer modules
2.	Be familiar with the capabilities of various Penetration Testing tools
3.	Be prepared to detect Access Control Vulnerabilities
4.	Be prepared to detect machine and human manipulations
Objective:	
Sl. No.	
1.	Understand the concepts and terminology behind defensive, secure, coding
2.	Describe and apply core theories, models and methodologies from the field of HCI.
3.	Describe and discuss current research in the field of HCI.
4.	Idea to design, implement and evaluate effective and usable graphical computer interfaces.
5.	Describe special considerations in designing user interfaces for older adults.
Pre-Requisite:	
Sl. No.	

1.	Basic knowledge of computer Applications		
2.	Understanding Internet Architectures		
Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Human Computer Interface** Importance of User Interface, History of Human Computer Interface, Importance of Good Design, Benefits of Good Design, Principles of User Interface Design. **Interaction Devices** Keyboard Keys, Function Keys, Pointing Devices, Speech Recognition, Handwriting Recognition, Speech Generation, Image Display, Video Display, Device Drivers.	**9**	**17**
02	**Interface Design Process** Human Interaction with Computers, Human Interaction Speeds, Human Characteristics in Design, Human Consideration in Design. **Graphical User Interface** Popularity of Graphics, Characteristics of Graphical User Interface, Concepts of Direct Manipulation, Graphical System Advantages and Disadvantages, Web User Interface Characteristics and Popularity. **Device and Screen-Based Control** Device Based Controls, Operable Controls, Text Entry/Read-Only Controls, Selection Controls, Combining Entry/Selection Controls, Other Operable Controls, Presentation Controls and Selecting Proper Controls.	**9**	**18**
03	Window characteristics, Components of Window, Window Presentation Styles, Types of Windows, Window Management. Understanding Business Functions Business Definitions and Requirement analysis, Determining Business Functions, Design Standards or Style Guides, System Training and Documentation. Software Tools Specification Methods, Interface Building Tools-Interface Mock Up Tools, Software Engineering Tools, Windowing System Layer, GUI Tool Kit Layer.	**9**	**17**
04	**Information Search and Visualization and Time** Database Query, Phase Search in Documents, Multimedia Document Searches, Information Visualization, Advanced Filtering, Hypertext, Web Technology, Static Web Content and Dynamic Web Content. Response Time, Dealing with Time Delays, Echo Delay, File Delay, Blinking for Attention, Use of Sound, Preventing Errors	**9**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Preece, Sharp & Rogers	Interaction Design: Beyond Human-Computer Interaction,	Fourth Edition (2015).	

Cooper, Reimann, Cronin, & Noessel	About Face: The Essentials of Interaction Design	Fourth Edition, 2014	

Reference Books:

Norman, D.	The Design of Everyday Things		

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	**1,2,3,4**	**10**	**10**				
B	**1,3,4**			**5**	**3**	**5**	**60**
C	**1,2,3,4**			**5**	**3**	**15**	

- Only multiple choice type questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Web Application Security	
Course Code: BITBC502B	**Semester: V**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 3	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
5.	Be familiar with the capabilities of various Browser Proxies
6.	Be familiar with the capabilities of various Penetration Testing tools
7.	Be prepared to detect Access Control Vulnerabilities
8.	Be prepared to detect SQL Injection Vulnerabilities
Objective:	
Sl. No.	
6.	Understand the concepts and terminology behind defensive, secure, coding

7.	Appreciate the magnitude of the problems associated with web application security and the potential risks associated with those problems
8.	Understand the use of Threat Modeling as a tool in identifying software vulnerabilities based on realistic threats against meaningful assets
9.	Understand the consequences for not properly handling untrusted data such as denial of service, cross-site scripting, and injections

Pre-Requisite:	
Sl. No.	
3.	Basic knowledge of Web Application
4.	Understanding Internet Architectures

Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Application Security** HTTPS, HSTS, SMIME, PGP, SET, E-mail and IM security, DNSSec, eSMTPS, DKIM, MARC, DNSSec, SMTP STS	**9**	**17**
02	**Secure Configuration of Applications** Security Issues in TCP/IP – Web Server, Database Server, Email Server	**9**	**18**
03	**Security protocols at application level** PGP, HTTPS, SSH, etc. Proxy or application level gateways as security devices	**9**	**17**
04	**Vulnerabilities and Countermeasures** Popular OWASP Vulnerabilities and Countermeasures	**9**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Nitesb Dbanjani, Billy Rios & Brett Hardin	Hacking: The Next generation		O'reilly, 2009
Joel Scambray, Vincent Liu & Caleb Sima	Hacking Exposed Web Applications		McGraw-Hill Education, 2010
Reference Books:			
Mike Shema	Seven Deadliest Web Application Attacks		Elsevier, 2010

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	**1,2,3,4**	**10**	**10**				
B	**1,3,4**			**5**	**3**	**5**	**60**

C	**1,2,3,4**			**5**	**3**	**15**	

- Only multiple choice type questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Visual Cryptography			
Course Code: BITBC502 C		**Semester: V**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		**End Semester Exam: 70**	
Tutorial: 0		**Attendance: 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit: 3		**Practical Sessional internal continuous evaluation: NA**	
		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	To understand the fundamentals of Cryptography		
2.	To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.		
3.	To understand the various key distribution and management schemes		
Objective:			
Sl. No.			
1.	To design security applications in the field of Information technology		
2.	To understand how to deploy encryption techniques to secure data in transit across data networks		
3.	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.		
Pre-Requisite:			
Sl. No.			
1.	Cryptography		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction** Terminologies used in Cryptography; Substitution Techniques – The Caesar Cipher, One-Time Pads, The Vernam Cipher, Book Cipher; Transposition Techniques – Encipherment/Decipherment Complexity, Digrams, Trigrams, and Other Patterns.	**7**	**14**
02	**Watermarking**	**7**	**14**

	History of watermarking – Importance of digital watermarking – Applications – Properties – Evaluating watermarking systems. WATERMARKING MODELS & MESSAGE CODING: Notation – Communications – Communication based models – Geometric models – Mapping messages into message vectors – Error correction coding – Detecting multi-symbol watermarks.		
03	**Encryption for Images**	**7**	**14**
04	**Encryption for Video**	**7**	**14**
05	**Type of Attacks** Need for Security; Security Attack – Threats, Vulnerabilities, and Controls, Types of Threats (Attacks); Security Services – Confidentiality, Integrity, Availability; Information Security; Methods of Protection.	**8**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
R.A. Mollin	An Introduction to Cryptography		Chapman & Hall, 2001
Silverman and Tate	Rational Points on Elliptic Curves		Springer 2005
Reference Books:			
Hankerson, Menezes, Vanstone	Guide to elliptic curve cryptography		Springer, 2004
Jones and Jones	Elementary Number Theory		Springer, 1998
Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker	Digital Watermarking and Steganography		Margan Kaufmann Publishers, New York, 2008

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 questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Threats in Mobile Application	
Course Code: BITBC502 D	**Semester: V**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 3	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
1.	Get to know the most important security risks (OWASP Mobile Top 10) of mobile apps with the aid of intentionally vulnerable mobile apps for iPhone and Android.
2.	Give overview of security architecture of a Mobile.

Objective:	
Sl. No.	
1.	The security architecture of Android and iOS, you will be guided through various application vulnerabilities and the corresponding countermeasures
2.	To apply what you have learned to your company's mobile application projects and will gain the competence for secure development and evaluation (self-assessment) of mobile apps

Pre-Requisite:	
Sl. No.	
1.	Good understanding of mobile devices advantageous
2.	Ability to read and understand source code

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Software and System Security** Control hijacking attacks – buffer overflow, integer overflow, bypassing browser memory protection, Sandboxing and Isolation, Tools and techniques for writing robust application software, Security vulnerability detection tools, and techniques – program analysis (static, concolic and dynamic analysis), Privilege, access control, and Operating System Security, Exploitation techniques, and Fuzzing	**7**	**14**
02	**Network Security & Web Security** Security Issues in TCP/IP – TCP, DNS, Routing (Topics such as basic problems of security in TCP/IP,, IPsec, BGP Security, DNS Cache	**8**	**14**

	poisoning etc), Network Defense tools – Firewalls, Intrusion Detection, Filtering, DNSSec, NSec3, Distributed Firewalls, Intrusion Detection tools, Threat Models, Denial of Service Attacks, DOS-proof network architecture, Security architecture of World Wide Web, Security Architecture of Web Servers, and Web Clients, Web Application Security – Cross Site Scripting Attacks, Cross Site Request Forgery, SQL Injection Attacks, Content Security Policies (CSP) in web, Session Management and User Authentication, Session Integrity, Https, SSL/TLS, Threat Modeling, Attack Surfaces, and other comprehensive approaches to network design for security		
03	**Security in Mobile Platforms** Android vs. ioS security model, threat models, information tracking, rootkits, Threats in mobile applications, analyzer for mobile apps to discover security vulnerabilities, Viruses, spywares, and keyloggers and malware detection	**7**	**14**
04	**Introduction to Hardware Security, Supply Chain Security** Threats of Hardware Trojans and Supply Chain Security, Side Channel Analysis based Threats, and attacks	**7**	**14**
05	**Issues in Critical Infrastructure and SCADA Security** Security issues in SCADA, IP Convergence Cyber Physical System Security threats, Threat models in SCADA and various protection approaches, Machine learning and SCADA Security	**7**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Scott J. Roberts, Rebekah Brown	Intelligence- Driven Incident Response: Outwitting the Adversary		O'Reilly Media, 2017
Henry Dalzie	How to Define and Build an Effective Cyber Threat Intelligence Capability		Elsevier Science & Technology, 2014
Reference Books:			
John Robertson, Ahmad Diab, Ericsson Marin, Eric Nunes, Vivin Paliath, Jana Shakarian, Paulo Shakarian,	DarkWeb Cyber Threat Intelligence Mining		Cambridge University Press, 2017
Bob Gourley	The Cyber Threat		Createspace Independent Pub, 2014
Wei-Meng Lee	Beginning AndroidTM 4 Application Development		John Wiley & Sons,2017

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 questions (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:

Name of the Course: B.Sc. in Information Technology (Blockchain Technology)
Subject: Cyber Law & Cyber Crime Investigation

Course Code: BITBC503	**Semester: V**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 1	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 4	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA

Aim:

Sl. No.	
1.	To provide knowledge related to auditing of computer systems, managing and mitigating risk situations in the organization and techniques for investigating financial frauds.
2.	To create awareness on cybercrime & IT law.
3.	Provide the assistance to handle cybercrime.
4.	To protect the girls against the cybercrime.

Objective:

Sl. No.	
1.	This course will look at the emerging legal, policy and regulatory issues pertaining to cyberspace and cybercrimes
2.	To cover all the topics from fundamental knowledge of Information Technology and Computer Architecture so that the participant can use to understand various aspects of working of a computer.
3.	To enable the participants appreciate, evaluate and interpret the case laws with reference to the IT Act and other Laws associated with the cyberspace.

4.	To identify the emerging Cyberlaws, Cybercrime & Cyber security trends and jurisprudence impacting cyberspace in today's scenario.

Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Cyberspace, Cybercrime and Cyber Law** The World Wide Web, Web Centric Business, e-Business Architecture, Models of e-Business, e-Commerce, Threats to virtual world. IT Act 2000 - Objectives, Applicability, Non-applicability, Definitions, Amendments and Limitations. Cyber Crimes- Cyber Squatting, Cyber Espionage, Cyber Warfare, Cyber Terrorism, Cyber Defamation. Social Media-Online Safety for women and children, Misuse of Private information.	**9**	**17**
02	**Regulatory Framework of Information and Technology Act 2000** Information Technology Act 2000, Digital Signature, E-Signature, Electronic Records, Electronic Evidence and Electronic Governance. Controller, Certifying Authority and Cyber Appellate Tribunal. (Rules announced under the Act), Network and Network Security, Access and Unauthorized Access, Data Security, E Contracts and E Forms.	**9**	**17**
03	**Offences and Penalties** Information Technology (Amendment) Act 2008 – Objective, Applicability and Jurisdiction; Various cyber-crimes under Sections 43 (a) to (j), 43A, 65, 66, 66A to 66F, 67, 67A, 67B, 70, 70A, 70B, 80 etc. along with respective penalties, punishment and fines, Penal Provisions for Phishing, Spam, Virus, Worms, Malware, Hacking, Trespass and Stalking; Human rights in cyberspace, International Co-operation in investigating cybercrimes.	**9**	**18**
04	**Indian Evidence Act** Classification – civil, criminal cases. Essential elements of criminal law. Constitution and hierarchy of criminal courts. Criminal Procedure Code. Cognizable and non-cognizable offences. Bailable and non-bailable offences. Sentences which the court of Chief Judicial Magistrate may pass. Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. Section 293 in the code of criminal procedure. Secondary Evidence Section 65-B.	**9**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Karnika Seth	Computers, Internet and New Technology Laws		Lexis Nexis Buttersworth Wadhwa, 2012
Jonathan Rosenoer	Cyber Law: The Law of Internet		Springer- Verlag, New York, 1997

Reference Books:

Sreenivasulu N.S	Law Relating to Intellectual Property		Patridge Publishing, 2013
Pavan Duggal	Cyber Law – The Indian Perspective		Saakshar Law Publications
Harish Chander	Cyber Laws and IT Protection		PHI Learning Pvt. Ltd, 2012

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	**1,2,3,4**	**10**	**10**				
B	**1,2,3,4,**			**5**	**3**	**5**	**60**
C	**1,2,3,4**			**5**	**3**	**15**	

- Only multiple choice type questions (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: B.Sc. in Information Technology (Blockchain Technology)

Subject: Information and Coding Theory

Course Code: BITBC504	**Semester: V**
Duration: 36	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial: 1	Attendance: 5
Practical:0	Continuous Assessment:25
Credit: 4	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA

Aim:

Sl. No.	

1.	The aim of this course is to provide a basic understanding of the nature of information, the effects of noise in analogue and digital transmission systems and the construction of both source codes and error-detection/-correction codes.
Objective:	
Sl. No.	
1	To equip students with the basic understanding of the fundamental concept of source coding, error correction and information as they are used in communications.
2	To enhance knowledge of probabilities, entropy and measures of information.
3	To guide the student through the implications and consequences of information theory and coding theory with reference to the application in modern communication and computer systems.
Pre-Requisite:	
Sl. No.	
1	Strong mathematical knowledge on probability and abstract algebra.
2	And the ability to understand new mathematical concepts as needed.

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Source Coding:** Uncertainty and information, average mutual information and entropy, information measures for continuous random variables, source coding theorem, Huffman codes.	**6**	**10**
02	**Channel Capacity And Coding:** Channel models, channel capacity, channel coding, information capacity theorem, The Shannon limit.	**7**	**20**
03	**Linear And Block Codes For Error Correction:** Matrix description of linear block codes, equivalent codes, parity check matrix, decoding of a linear block code, perfect codes, Hamming codes.	**8**	**20**
04	**Cyclic Codes:** Polynomials, division algorithm for polynomials, a method for generating cyclic codes, matrix description of cyclic codes, Golay codes. BCH Codes Primitive elements, minimal polynomials, generator polynomials in terms of minimal polynomials, examples of BCH codes.	**7**	**10**
05	**Convolutional Codes**	**8**	**10**

	Tree codes, trellis codes, polynomial description of convolutional codes, distance notions for convolutional codes, the generating function, matrix representation of convolutional codes, decoding of convolutional codes, distance and performance bounds for convolutional codes, examples of convolutional codes, Turbo codes, Turbo decoding.		
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Assignments:

Based on the curriculum as covered by subject teacher.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Ranjan Bose	Information theory, coding and cryptography		TMH
N Abramson	Information and Coding		McGraw Hil

Reference Books:

M Mansurpur	Introduction to Information Theory		McGraw Hill
R B Ash	Information Theory		Prentice Hall.

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**				**60**
B				**5**	**3**	**5**	
C	**1 to 5**			**5**	**3**	**15**	

	1 to 5						

- 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**	**3**	**3**

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Major Project I	
Course Code: BITBC581	**Semester: V**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 0	**End Semester Exam: 100**
Tutorial: 0	**Attendance: 0**
Practical: 4	**Continuous Assessment: 0**
Credit: 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60
Contents	
Students will do projects on application areas of latest technologies and current topics of societal relevance.	

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Industrial Training and Internship	
Course Code: BITBC582	**Semester: V**
Duration: NA	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 0	**End Semester Exam: 100**
Tutorial: 0	**Attendance: 0**
Practical: 2	**Continuous Assessment: 0**
Credit: 1	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: 100
Contents	
Students be encouraged to go to Industrial Training/Internship for at least 2-3 months during semester break.	

SEMESTER VI

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Incident Analysis and Threat Hunting	
Course Code: BITBC601	**Semester: IV**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 1	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 4	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA

Aim:

Sl. No.	
4.	Detect and hunt unknown live, dormant, and custom malware in memory across multiple Windows systems in an enterprise environment
5.	Hunt through and perform incident response across hundreds of unique systems simultaneously using PowerShell or F-Response Enterprise and the SIFT Workstation
6.	Identify and track malware beaconing outbound to its command and control (C2) channel via memory forensics, registry analysis, and network connection residue

Objective:

Sl. No.	
5.	Understand how the attacker can acquire legitimate credentials-including domain administrator rights-even in a locked-down environment
6.	Use collected data to perform effective remediation across the entire enterprise
7.	To know how to recover and analyze archives and .rar files used by APT-like attackers to exfiltrate sensitive data from the enterprise network

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Advanced Incident Response & Threat Hunting** Real Incident Response Tactics; Threat Hunting; Threat Hunting in the Enterprise;Incident Response and Hunting across Endpoints; Malware Defense Evasion and Identification; Malware Persistence Identification; Investigating WMI-Based Attacks	**9**	**17**
02	**Intrusion Analysis** Stealing and Utilization of Legitimate Credentials; Advanced Evidence of Execution Detection; Lateral Movement Adversary Tactics, Techniques, and Procedures (TTPs); Log Analysis for Incident Responders and Hunters	**9**	**18**

03	**Timeline Analysis**Timeline Analysis Overview; Memory Analysis Timeline Creation; Filesystem Timeline Creation and Analysis; Super Timeline Creation and Analysis	**9**	**17**
04	**Memory Forensics in Incident Response & Threat Hunting** Remote and Enterprise Incident Response; Triage and Endpoint Detection and Response (EDR); Memory Acquisition; Memory Forensics Analysis Process for Response and Hunting; Memory Forensics Examinations; Memory Analysis Tools	**9**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Assignments:

Adhered to theory curriculum as conducted by the subject teacher.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Peter H. Gregory	Threat Hunting for Dummies, Carbon Black Special Edition	ISBN: 978-1-119-31701-2 ; ISBN: 978-1-119-31703-6	John Wiley & Sons, Inc.
Reference Books:			
Michael Collins	Threat Hunting	ISBN: 9781492028260	O'Reilly Media, Inc.

List of equipment/apparatus for laboratory experiments:

Sl. No.	
2.	Computer

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 questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Malware Detection			
Course Code: BITBC602		**Semester: VI**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		**End Semester Exam: 70**	
Tutorial: 1		**Attendance: 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit: 4		**Practical Sessional internal continuous evaluation: NA**	
		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	Possess the skills necessary to carry out independent analysis of modern malware samples using both static and dynamic analysis techniques.		
2.	Have an intimate understanding of executable formats, Windows internals and API, and analysis techniques.		
3.	Extract investigative leads from host and network-based indicators associated with a malicious program		
4.	Apply techniques and concepts to unpack, extract, decrypt, or bypass new anti-analysis techniques in future malware samples		
Objective:			
Sl. No.			
1.	To understand of operating system and malware.		
2.	Able to analize static and dynamic analysis of malware.		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**INTRODUCTION** Introduction to malware, OS security concepts, malware threats, evolution of malware, malware types viruses, worms, rootkits, Trojans, bots, spyware, adware, logic bombs, malware analysis, static malware analysis, dynamic malware analysis	**7**	**14**
02	**STATIC ANALYSIS** X86 Architecture- Main Memory, Instructions, Opcodes and Endianness, Operands, Registers, Simple Instructions, The Stack, Conditionals, Branching, Rep Instructions, C Main Method and Offsets. Antivirus Scanning, Fingerprint for Malware, Portable Executable File Format, The PE File Headers and Sections, The Structure of a Virtual Machine, Reverse Engineering- x86 Architecture, recognizing c code constructs in assembly, c++ analysis,	**7**	**14**

	Analyzing Windows programs, Anti-static analysis techniques obfuscation, packing, metamorphism, polymorphism.		
03	**DYNAMIC ANALYSIS** Live malware analysis, dead malware analysis, analyzing traces of malware- system-calls, api-calls, registries, network activities. Anti-dynamic analysis techniquesanti-vm, runtime-evasion techniques, , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching	**7**	**14**
04	**Malware Functionality** Downloader, Backdoors, Credential Stealers, Persistence Mechanisms, Privilege Escalation, Covert malware launching-Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection.	**7**	**14**
05	**Malware Detection Techniques & Android Malware** Signature-based techniques: malware signatures, packed malware signature, metamorphic and polymorphic malware signature Non-signature based techniques: similarity-based techniques, machine-learning methods, invariant inferences Malware Characterization, Case Studies – Plankton, DroidKungFu, AnserverBot, Smartphone (Apps) Security	**8**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Michael Davis, Sean Bodmer, Aaron Lemasters	Hacking exposed™ malware & rootkits: malware & rootkits security secrets & Solutions	ISBN: 978-0-07-159119-5	McGraw-Hill
Filiol	Computer viruses: from theory to applications		Eric Springer Science & Business Media, 2006
Reference Books:			
Xuxian Jiang and Yajin Zhou	Android Malware	ISBN 978-1-4614-7393-0	Springer
Michael Sikorski and Andrew Honig	Practical malware analysis The Hands-On Guide to Dissecting Malicious Software	ISBN-10: 159327-290-1	

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 questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Blockchain in Financial Services: Strategic Action Plan		
Course Code: BITBC603A	**Semester: VI**	
Duration: 36 Hrs.	**Maximum Marks: 100**	
Teaching Scheme	**Examination Scheme**	
Theory: 3	**End Semester Exam: 70**	
Tutorial: 0	**Attendance: 5**	
Practical: 0	**Continuous Assessment: 25**	
Credit: 3	**Practical Sessional internal continuous evaluation: NA**	
	Practical Sessional external examination: NA	
Aim:		
Sl. No.		
1.	To identify a specific need or problem within the financial services industry that can potentially be solved using blockchain technology.	
2.	To investigate possible solutions to this problem, and to develop a strategic plan for how these solutions might be executed. You will accomplish different project milestones each week, and will be introduced to several tools to organize your findings.	
Objective:		
Sl. No.		
1.	Identify new ideas or opportunities for blockchain within the financial services industry	
2.	Explain how you will position your idea, including how your idea will create new value for your customers	
3.	Identify the business model decisions that would need to be made in order to assess the feasibility of your idea	
4.	Develop an execution plan for your idea, including a budget and project roadmap, and consolidate your work into a coherent Strategic Action Plan	
Pre-Requisite:		
Sl. No.		
1.	Introduction to Blockchain	
Contents		**3 Hrs./week**

Chapter	Name of the Topic	Hours	Marks
01	**Industry Analysis** Industry Transformations Introduction to the Blockchain Case Commons Exploratory Market Research Conducting Preliminary Market Research How to Perform a Competitive Analysis	**9**	**17**
02	**Opportunity Identification** Problems That Blockchain Can and Cannot Solve How To Write a Good Problem Statement Blockchain Brainstorm Problem Solving With Blockchain Decision Matrix Statement of Benefit	**9**	**18**
03	**Positioning** Explain that risk assessment can be carried out using several methodologies or frameworks Positioning Your Idea Strategic Positioning of Your Organization	**9**	**17**
04	**Execution Plan** Business Model Considerations Operational Considerations Work Breakdown Structure Time Management Project Cost Estimation	**9**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Mohsen Attaran Angappa Gunasekaran	Applications of Blockchain Technology in Business	Edition 1/978-3-030-27797-0	Springer International Publishing
Reference Books:			
Umit Hacioglu	Digital Business Strategies in Blockchain Ecosystems	Edition 1/978-3-030-29738-1	Springer International Publishing

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	**1,2,3**	**10**	**10**				
B	**1,2,3**			**5**	**3**	**5**	**60**

C	**1,2,3**			**5**	**3**	**15**	

- Only multiple choice type questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Blockchain and Business: Applications and Implications	
Course Code: BITBC603B	**Semester: VI**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 3	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
1.	This technology will disrupt how enterprises are funded and managed, how they create value, and even how they perform basic functions like marketing and accounting.
2.	In this course you will learn how blockchain technology will penetrate into the structures of organizations.
3.	You will explore how blockchain will transform the roles of the C-Suite, and how a blockchain can be used to manage and protect intellectual property.
4.	You will be able to identify the different layers of the blockchain technology stack, and explain how these affect the governance of blockchain systems.
5.	As well, you will be able to identify seven qualities that a region in the world needs in order to attract technology startups and to build a vibrant blockchain ecosystem.

Objective:	
Sl. No.	
1.	Explain how blockchain technology will transform business structures, roles, and functions of enterprise
2.	Define terms such as Distributed Application (DApp), autonomous agent, open networked enterprise, and distributed autonomous enterprise
3.	Identify some strategic approaches to managing intellectual property with blockchain technologies
4.	Identify the layers comprising the blockchain technology stack, and describe how each of these affects the governance of a blockchain ecosystem

Pre-Requisite:	
Sl. No.	
1.	Introduction to Blockchain

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Re-architecting the Firm**	**9**	**17**

	Overview Decentralizing the Enterprise Transaction Costs and the Structure of the Firm hypothesis Decentralizing the Enterprise Transaction Costs and the Structure of the Firm Opportunities for Blockchain		
02	**New Business Models** Distributed Business Entities New Business Models Part New Business Models Part DApps Patents and Blockchain Innovation Payments, Attribution, and Licensing Distributed Ownership	**9**	**18**
03	**Blockchain and the C-Suite** Explanation of Grading Scheme The CEO, The COO The CLO, The CFO The CMO, The CIO & CTO The CHRO	**9**	**17**
04	**Leadership for the Next Era** Blockchain Governance Profile of a Blockchain Hotbed Leadership for Transformation	**9**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Rodrigo da Rosa Righi Antonio Marcos Alberti Madhusudan Singh	Blockchain Technology for Industry 4.0	Edition 1, 978-981-15-1137-0 and 978-981-15-1136-3	Springer Singapore
Reference Books:			
Andreas Antonopoulos	The Internet of Money,	Volumes 1 - 3	

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**	**1,2,3** **1,2,3**	**10**	**10**	 **5**	 **3**	 **5**	 **60**

C	**1,2,3**			**5**	**3**	**15**	

- Only multiple choice type questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Security Assessment and Risk Analysis			
Course Code: BITBC603C		**Semester: VI**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3		**End Semester Exam: 70**	
Tutorial: 0		**Attendance: 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit: 3		**Practical Sessional internal continuous evaluation: NA**	
		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	It will provide a background in the many aspects of security management associated with today's modern communications and networks		
2.	It includes the fundamentals of Risk Analysis, Risk Management, Security Policy, Security Operations, Legal issues, Business issues and Secure Systems Development.		
Objective:			
Sl. No.			
1.	Understand the role of Security Management in information technology		
2.	Quantify the properties of Information Security systems		
3.	Develop project plans for secure complex systems with knowledge of SANS 20 critical controls		
4.	Demonstrate understanding of the role of firewalls, guards, proxy servers and intrusion detection in networks on a Linux OS with traffic analysis		
5.	Evaluate the residual risk of a protected network		
Pre-Requisite:			
Sl. No.			
1.	Application of cryptography		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Risk Assessment** Understand the principles and terminology of risk; Probability, Likelihood, Threat, Vulnerability, Impact , Threat actor, Risk owner, Understand and describe the five key steps in risk management: Identify assets Identify threats and vulnerabilities, Assess the impact of threats and vulnerabilities on an organisation	**12**	**23**

	Identify ways to manage those threats and vulnerabilities, Monitor and report on risk management action, Discuss qualitative and quantitative approaches to risk assessment; Quantitative approaches (such as loss expectancy approaches (SLE/ARO)), Quantitative scalar approaches (such as High/Medium/Low), Illustrate how the results of an assessment can be presented; Financial impact, Dashboards, Heat maps, RAG.		
02	**Risk Assessment: Threat and Vulnerabilities** Define and state the differences between: Threat, Vulnerability, Exploit, Attack, Describe and explain the following: Categories of threats The concept of a threat lifecycle The use of threat intelligence in an organisation. The uses of attribution, Discuss vulnerabilities, especially those relating to people and staff. Apprentices will understand how they can be exploited to attack an organisation; Phishing, Social engineering, Blended attacks, Describe common methods for finding vulnerabilities; Penetration testing Phishing simulators Social engineering attacks	**12**	**23**
03	**Risk Assessment: Standards** Explain that risk assessment can be carried out using several methodologies or frameworks, but that it is better to select one methodology or framework for consistent and comparable results, List the common risk assessment methodologies or frameworks; ISO/IEC 27005, NIST, Risk Management, Framework, OCTAVE, FAIR, Compare common risk methodologies/frameworks; highlighting similarities and differences. Demonstrate how to select and then apply a risk methodology/framework in an organisation.	**12**	**24**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Mark Ryan M. Talabis and Jason L. Martin	Information Security Risk Assessment Toolkit: Practical Assessments through Data Collection and Data Analysis		Syngress, 2012
Reference Books:			
Douglas J. Landoll	The Security Risk Assessment Handbook: A Complete Guide for Performing Security Risk Assessments		CRC Press, 2011

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	**1,2,3**	**10**	**10**				
B	**1,2,3**			**5**	**3**	**5**	**60**
C	**1,2,3**			**5**	**3**	**15**	

- Only multiple choice type questions (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: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Grand Viva	
Course Code: BITBC681	**Semester: VI**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 0	**End Semester Exam: 100**
Tutorial: 0	**Attendance: 0**
Practical: 8	**Continuous Assessment: 0**
Credit: 4	**Practical Sessional internal continuous evaluation: 0**
	Practical Sessional external examination: 0
Contents	
Students will give a viva from all the subject that they have covered in the course.	

Name of the Course: B.Sc. in Information Technology (Blockchain Technology) **Subject:** Major Project II	
Course Code: BITBC682	**Semester: VI**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 0	**End Semester Exam: 100**
Tutorial: 0	**Attendance: 0**
Practical: 8	**Continuous Assessment: 0**
Credit: 4	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60
Contents	
Students will do projects on application areas of latest technologies and current topics of societal relevance.	