



MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

NH-12 (Old NH-34), Simhat, Haringhata, Nadia -741249

Department of Information Technology (In-house)

B.Sc. in Information Technology (Cyber Security)

(Effective from academic session 2019-20)

Semester-III

Name of the Course: B.Sc. in Information Technology (Cyber Security)			
Subject: Computer Networks & Computer networks Lab			
Course Code: BITCS301 + BITCS391		Semester: III	
Duration: 36 Hrs.		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical: 4 hrs./week		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 algorithms.		
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

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	Internal Assessment Examination & Preparation of Semester Examination		4	30																																																																		
	Total:		40	100																																																																		
<p>Practical: Skills to be developed: Intellectual skills:</p> <ol style="list-style-type: none"> 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 <p>List of Practical: Based on theory lectures. Assignments: Adhered to theory curriculum as conducted by the subject teacher.</p> <p>List of Books Text Books:</p> <table border="1"> <thead> <tr> <th>Name of Author</th> <th>Title of the Book</th> <th>Edition/ISSN/ISBN</th> <th>Name of the Publisher</th> </tr> </thead> <tbody> <tr> <td>Larry L. Peterson, Bruce S. Davie</td> <td>Computer Networks: A Systems Approach</td> <td>Fifth</td> <td>Morgan Kaufmann Publishers</td> </tr> <tr> <td>Behrouz A. Forouzan</td> <td>Data Communication and Networking</td> <td>Fourth</td> <td>Tata McGraw – Hill</td> </tr> <tr> <td>James F. Kurose, Keith W. Ross</td> <td>Computer Networking – A Top-Down Approach Featuring the Internet</td> <td>Fifth</td> <td>Pearson Education</td> </tr> </tbody> </table> <p>Reference Books:</p> <table border="1"> <tbody> <tr> <td>Nader. F. Mir</td> <td>Computer and Communication Networks</td> <td></td> <td>Pearson Prentice Hall Publishers</td> </tr> <tr> <td>Ying-Dar Lin, Ren-Hung Hwang, Fred Baker</td> <td>Computer Networks: An Open Source Approach</td> <td></td> <td>McGraw Hill Publisher</td> </tr> </tbody> </table> <p>List of equipment/apparatus for laboratory experiments:</p> <table border="1"> <thead> <tr> <th>Sl. No.</th> <th></th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Computer with Internet Connection</td> </tr> </tbody> </table> <p>End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.</p> <table border="1"> <thead> <tr> <th rowspan="2">Group</th> <th rowspan="2">Unit</th> <th colspan="2">Objective Questions (MCQ only with the correct answer)</th> <th colspan="4">Subjective Questions</th> </tr> <tr> <th>No of question to be set</th> <th>Total Marks</th> <th>No of question to be set</th> <th>To answer</th> <th>Marks per question</th> <th>Total Marks</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1 to 5</td> <td>10</td> <td>10</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B</td> <td>1 to 5</td> <td></td> <td></td> <td>5</td> <td>3</td> <td>5</td> <td>60</td> </tr> <tr> <td>C</td> <td>1 to 5</td> <td></td> <td></td> <td>5</td> <td>3</td> <td>15</td> <td></td> </tr> </tbody> </table> <p>● Only multiple choice type questions (MCQ) with one correct answer are to be set in the</p>					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	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	Sl. No.		1.	Computer with Internet Connection	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	
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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



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Name of the Course: B.Sc. in Information Technology (Cyber Security)			
Subject: Design and Analysis of Algorithms & Design and Analysis of Algorithms Lab			
Course Code: BITCS302 + BITCS392		Semester: III	
Duration: 36 Hrs.		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical: 4 hrs./week		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 Knowledge		
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	7	14

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	Conquer Methodology – Binary Search – Merge sort – Quick sort – Heap Sort – Multiplication of Large Integers – Closest-Pair and Convex – Hull Problems		
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
AnanyLevitin	Introduction to the Design and Analysis of Algorithms	Third Edition	Pearson Education
Thomas H.	Introduction to	III edition	The MIT Press

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Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	Algorithms						
Reference Books:							
Steven 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	
<ul style="list-style-type: none"> 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



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Name of the Course: B.Sc. in Information Technology (Cyber Security)			
Subject: DBMS and SQL injection Attack & DBMS and SQL injection Attack Lab			
Course Code: BITCS303 + BITCS393		Semester: III	
Duration: 36 Hrs.		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical: 4 hrs./week		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 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	3	6
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 Basic Operations, Union (U), Difference (-), Intersection (∩), Cartesian Product (x); Additional Relational Algebraic Operations, Projection (π), Selection (σ), JOIN (⋈), Division (⋈)	3	7
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 (BCNF); Fourth and Fifth Normal Form	4	7
11	SQL Injection	4	6

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	Introduction to Injection Attacks; Data Store Injection; Introduction to XML, JavaScript and SQL injection attacks; Different Statement Injection; UNION Operator; Database Fingerprinting		
	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	Subjective Questions
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		correct answer)		No of question to be set	To answer	Marks per question	Total Marks
		No of question to be set	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
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External Examination: Examiner-

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



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Name of the Course: B.Sc. in Information Technology (Cyber Security)			
Subject: Access Control & OS Security			
Course Code: BITCS304		Semester: III	
Duration: 36 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 1 hr./week		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



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	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



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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	
<ul style="list-style-type: none"> 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			



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Name of the Course: B.Sc. in Information Technology (Cyber Security)			
Subject: Steganography & Watermarking			
Course Code: BITCS305		Semester: III	
Duration: 36 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 1 hr./week		Attendance : 5	
Practical: 0		Continuous Assessment: 25	
Credit: 4		Practical Sessional internal continuous evaluation: NA	
		Practical Sessional external examination: NA	
Aim:			
Sl. No.			
1.	Know the History and importance of watermarking and steganography		
2.	Analyze Applications and properties of watermarking and steganography		
3.	Demonstrate Models and algorithms of watermarking		
4.	Possess the passion for acquiring knowledge and skill in preserving authentication of Information		
Objective:			
Sl. No.			
1.	To learn about the watermarking models and message coding		
2.	To learn about watermark security and authentication.		
3.	To learn about steganography. Perceptual models		
Pre-Requisite:			
Sl. No.			
1.	Cryptography		
Contents			4 Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	INTRODUCTION Information Hiding, Steganography and Watermarking – 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.	7	14
02	WATERMARKING WITH SIDE INFORMATION & ANALYZING ERRORS: Informed Embedding – Informed Coding – Structured dirty-paper codes – Message errors – False positive errors – False negative errors – ROC curves – Effect of whitening on error rates	7	14



MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

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Department of Information Technology (In-house)

B.Sc. in Information Technology (Cyber Security)

(Effective from academic session 2019-20)

		question to be set	Marks	question to be set		question	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