SEMESTER I					
Code	**Course Title**	**Hours per week**			**Credits**
		L	**T**	**P**	
MITCS101	Program Core I ● Discrete Mathematics of Computer Science	3	0	0	3
MITCS102	Program Core II ● Advanced Data Structures and Algorithms	3	0	0	3
MITCS103	Program Core III ● Cryptology	3	0	0	3
MITCS104	Program Core IV ● Advanced Web Technology	3	0	0	3
MITCS 105	Research Methodology and IPR	2	0	0	2
MITCS106 A/B/C/D/E /F	Elective I A. Advanced Operating Systems B. Advanced DBMS C. Machine Learning D. Computer Graphics and Image Processing E. Sensor Networks and Internet of Things F. Cloud Computing	3	0	0	3
MITCS192	Laboratory 1 ● Advanced Data Structures and Algorithms	0	0	4	2
MITCS194	Laboratory 2 ● Advanced Web Technology Lab	0	0	4	2
MITCS196 A/B/C/D/E /F	Laboratory 3 ● Based on Elective I	0	0	4	2
Total Credits: 23					

Name of the Course:M.Sc in IT (Cyber Security) **Subject:** Discrete Mathematics of Computer Science	
Course Code: MITCS101	**Semester: I**
Duration: 40 Hours	**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 determine multiplicative inverses, modulo n and use to solve linear congruences graph theory.
2.	To solve different engineering problems using counting techniques.

Objective:	
Sl. No.	
1.	To express a given logic sentence in terms of predicates, quantifiers, and logical connectives and derive the solution for a given a problem using deductive logic and prove the solution based on logical inference.
2.	To classify the algebraic structure for a given mathematical problem and evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
3.	To develop the given problem as graph networks and solve with techniques of graph theory.
4.	To accrue knowledge in fuzzy Set
Pre-Requisite:	
Sl. No.	
1.	Knowledge of basic mathematics.
2.	Analytical and Logical skills

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Theory of Numbers: Principles of Mathematical Induction, Well Ordering Principle, Divisibility theory and properties of divisibility; Fundamental theorem of Arithmetic; Euclidean Algorithm for finding G.C.D and some basic properties of G.C.D with simple examples; Congruence, Residue classes of integer modulo n (Zn) and its examples, Chinese Remainder Theorem.	**6**	**5**
02	Counting Techniques: Pigeon- hole Principle, Principles of inclusion and exclusions; Recurrence relations: Formulation & Modelling of different counting problems in terms of recurrence relations, Solution of linear recurrence relations with constant coefficients (upto second order) by (i) The iterative method (ii) Characteristic roots method (iii) Generating functions method.	**6**	**10**
03	Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.	**6**	**15**
04	Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Permutation Groups, Normal Subgroups, Quotient group, Homomorphism & Isomorphism (Elementary properties only). Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean	**6**	**20**

	Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.		
05	Graphs: Planar and Dual Graphs. Kuratowski's graphs. Homeomorphic graphs. Eulers formula (n - e + r = 2) for connected planar graph and its generalisation for disconnected graphs. Detection of planarity. Graph colouring. Chromatic numbers of simple graphs. Chromatic Numbers and its bounds, Independence and Clique Numbers, Perfect Graphs-Definition and examples, Chromatic polynomial and its determination, Applications of Graph Colouring. Simple applications of chromatic numbers. Statement of four and five colour theorems.	**6**	**10**
06	Fuzzy sets: Introduction, crispness, vagueness, fuzziness, uncertainty. Basic definitions and examples, basic set theoretic operations – union, intersection, complementation and their simple properties. [3L] Soft sets: Introduction, Definition with examples, Soft set as generalization of fuzzy set, complement, null soft set, Absolute soft set, definition of general binary operation, union, intersection, simple properties – De Morgan‘s law, soft point, soft function and soft inverse function, simple properties.	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Practical:
Assignments: Based on Theory Lecture.

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
C L Liu and D P Mohapatra	Elements of Discrete Mathematics A Computer Oriented Approach		3rd Edition by, Tata McGraw – Hill.
N. Chandrasekaran and M. Umaparvathi	Discrete Mathematics, PHI.		
J.K. Sharma	Discrete Mathematics, Macmillan.		
Zimmermann	Fuzzy Set Theory		
Reference Books			
Kenneth H. Rosen	Discrete Mathematics and its Applications		Tata McGraw – Hill
Susanna S. Epp	Discrete Mathematics with		4th edition, Wadsworth Publishing Co. Inc.

	Applications		
Douglas Brent West	Introduction to Graph Theory		Prentice Hall
Clark John, Holton Derek Allan	A First Look at Graph Theory		World Scientific
P.K.Maji et. al. – Compu.	Soft Set Theory		Math. Appl. 45(2003) 555-562

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	**1,2,3,4,5,6**			**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**

Name of the Course: M.Sc in IT (Cyber Security) **Subject:** Advanced Data Structures and Algorithms	
Course Code: MITCS102 & MITCS192	**Semester: I**
Duration: 40 Hours	**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 understand the data structures, their advantages and drawbacks, how to implement them in C, how their drawbacks can be overcome and what the applications are and where they can be used.		
Objective:			
Sl. No.			
1	To learn about the data structures/ methods/algorithms mentioned in the course with a comparative perspective .		
2	To make use of the most appropriate data structure/ method/algorithm in a program		
3	To enhance the efficiency (i.e. reduce the run-time) or for better memory utilization		
4	To understand at least the efficiency aspects of the graph and sorting algorithms covered in this course.		
5	To convert an inefficient program into an efficient one using the knowledge gathered from this course.		
Pre-Requisite:			
Sl. No.			
1	Basic Computation and Principles of C		
2	Mathematics		
3	basics of set theory		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Module -I. Linear Data Structure Introduction : Why we need data structure? Concepts of data structures: a) Data and data structure b) Abstract Data Type and Data Type. Algorithms and programs, basic idea of pseudo-code. Algorithm efficiency and analysis, time and space analysis of algorithms – order notations. Array : Different representations – row major, column major. Sparse matrix - its implementation and usage. Array representation of polynomials. Linked List : Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications.	**8**	**15**
02	Module -II: Linear Data Structure [Stack and Queue : Stack and its implementations (using array, using linked list), applications. Queue, circular queue, dequeue. Implementation of queue- both linear and circular (using array, using linked list), applications. Recursion : Principles of recursion – use of stack, differences between recursion and iteration, tail recursion. Applications - The Tower of Hanoi, Eight Queens Puzzle.	**7**	**15**
03	Module -III. Nonlinear Data structures Trees : Basic terminologies, forest, tree representation (using array, using linked list). Binary trees - binary tree traversal (pre-, in-, post-order), threaded binary tree (left, right, full) - non-recursive traversal algorithms using threaded binary tree, expression tree. Binary search tree- operations (creation, insertion, deletion, searching). Height balanced binary tree – AVL tree (insertion,	**11**	**20**

	deletion with examples only). B- Trees – operations (insertion, deletion with examples only). Graphs : Graph definitions and concepts (directed/undirected graph, weighted/un-weighted edges, sub-graph, degree, cutvertex/articulation point, pendant node, clique, complete graph, connected components – strongly connected component, weakly connected component, path, shortest path, isomorphism). Graph representations/storage implementations – adjacency matrix, adjacency list, adjacency multi-list. Graph traversal and connectivity – Depth-first search (DFS), Breadth-first search (BFS) – concepts of edges used in DFS and BFS (tree-edge, back-edge, cross-edge, forward-edge), applications. Minimal spanning tree – Prim's algorithm (basic idea of greedy methods).		
04	Module - IV. Searching, Sorting : Sorting Algorithms : Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap, application – priority queue), radix sort. Searching : Sequential search, binary search, interpolation search. Hashing : Hashing functions, collision resolution techniques.	**10**	**20**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

List of Practical:

- Implementation of array operations:
- Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem :
- Evaluation of expressions operations on Multiple stacks & queues :
- Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues using linked lists:
- Polynomial addition, Polynomial multiplication
- Sparse Matrices : Multiplication, addition.
- Recursive and Nonrecursive traversal of Trees
- Threaded binary tree traversal. AVL tree implementation
- Application of Trees. Application of sorting and searching algorithms
- Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.
-

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
2/E by Robert L. Kruse, Bruce P. Leung.	"Data Structures And Program Design In C"		

Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.	"Fundamentals of Data Structures of C"		
Aaron M. Tenenbaum.	"Data Structures in C"		
Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.	"Introduction to Algorithms"		
Reference Books			
S. Lipschutz.	"Data Structures"		
Reema Thareja	"Data Structures Using C"		
2/e by A.K. Rath, A. K. Jagadev	"Data Structure Using C"		
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
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	**1,2,3,4,5,6**	**10**	**10**				
B	**1,2,3,4,5,6**			**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 Note Book		**10**	
On Spot Experiment(one for each group consisting 5 students)		**40**	
Viva voce		**10**	**60**

Name of the Course: M.Sc in IT (Cyber Security) **Subject:** Cryptology			
Course Code: MITCS103		**Semester: I**	
Duration: 40 Hours		**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 learn how theories, principles, and techniques based on cryptology can be used to achieve data security.		
Objective:			
Sl. No.			
	To understand the theories supporting common cryptographic methods, such as different types of hash-functions, symmetric and asymmetric ciphers, digital signatures and random numbers.		
	To analyse, use and implement such methods and reflect on their limits and applicability.		
Pre-Requisite:			
Sl. No.			
	Basic Concept of Cryptography		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Classical ciphers, Information Theoretic Security, Stream ciphers, Block ciphers, Cryptanalysis of Block and Stream Ciphers.	**12**	**20**
02	Formal models for block and stream ciphers: Pseudorandom generators, Pseudoran-	**12**	**30**

	dom functions and permutations. Symmetric key encryption: Notion of CPA and CCA security with examples. Symmetric key authentication. Cryptographic hash functions. Modern modes of operations: Authenticated Encryption, Tweakable Enciphering schemes. Introduction to public key encryption, computational security and computational as- sumptions.		
03	The Diffie Hellman key exchange. The RSA, ElGamal, Rabin and Pailler encryption schemes. Digital Signatures. Introduction to Elliptic Curve Cryptosystems. Public key infrastructures	**12**	**20**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Practical:
Assignments: Based on Theory Lecture.

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Stinson, Douglas R.	Cryptography : theory and practice		Chapman & Hall/CRC
Jonathan Katz, Yehuda Lindell	Introduction to Modern Cryptography		Chapman & Hall/CRC, 2007
Reference Books			
B. S. Schneier	Applied Cryptography: Protocols, Algorithms, and Source Code in C		John Wiley and Sons
A. Menezes, P. C. Van Oorschot and S. A. Vanstone	Handbook of Applied Cryptog-raphy		CRC 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	Total	No of	To	Marks	Total

		question to be set	Marks	question to be set	answer	per question	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 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: M.Sc. in Information Technology (Cyber Security) **Subject: Advance Web Technology**	
Course Code: MITCS104+MITCS194	**Semester: 1**
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:5	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
	To develop formal reasoning.
	Create habit of raising questions
	Knowledge regarding the use of markup languages in web development.
	Ability to communicate knowledge, capabilities and skills related to the computer engineer profession

Objective:

This Subject is useful for Making own Web page and how to host own web site on internet. Along with that Students will also learn about the protocols involve in internet technology.

Sl. No.	
	To make own web site and host their own web site on internet
	To gain knowledge about what are the technologies used in internet.
	To learn about the protocols involve in internet.

Pre-Requisite:			
Sl. No.			
	Basic knowledge of HTML, CSS		
Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
1	**Introduction to WWW** : Protocols and programs, secure connections, application and development tools, the web browser, What is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP **Web Design**: Web site design principles, planning the site and navigation,	4	13
2	**Introduction to HTML** : The development process, Html tags and simple HTML forms, web site structure **Introduction to XHTML** : XML, Move to XHTML, Meta tags, Character entities, frames and frame sets, inside browser.	5	17
3	**Style sheets** : Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2	5	17
4	**Javascript** : Client side scripting, What is Javascript, How to develop Javascript, simple Javascript, variables, functions, conditions, loops and repetition	3	10
5	**Advance script**, Javascript and objects, Javascript own objects, the DOM and web browser environments, forms and validations **DHTML** : Combining HTML, CSS and Javascript, events and buttons, controlling your browser, **Ajax:** Introduction, advantages & disadvantages ,Purpose of it ,ajax based web application, alternatives of ajax	3	10
6	**XML** : Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Well formed, using XML with application.XML, XSL and XSLT. Introduction to XSL, XML transformed simple example, XSL elements, transforming with XSLT	3	10
7	**PHP** : Starting to script on server side, Arrays, function and forms, advance PHP **Databases :** Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.	7	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. Skill to analyze problems and to determine web based solutions.
2. Knowledge of advanced technology of web development.
3. Ability to implement queries to perform various operations on database.

List of Practical:

1. Design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags.
2. Create your class timetable using table tag.
3. Create user Student feedback form (use textbox, text area , checkbox, radio button, select box etc.)
4. Create a web page using frame. Divide the page into two parts with Navigation links on left hand side of page (width=20%) and content page on right hand side of page (width = 80%). On clicking the navigation Links corresponding content must be shown on the right hand side.
5. Write html code to develop a webpage having two frames that divide the webpage into two equal rows and then divide the row into equal columns fill each frame with a different background color.
6. Create your resume using HTML tags also experiment with colors, text , link , size and also other tags you studied.
7. Design a web page of your home town with an attractive background color, text color, an Image, font etc. (use internal CSS).
8. Use Inline CSS to format your resume that you created.
9. Use External CSS to format your class timetable as you created.
10. Use External, Internal, and Inline CSS to format college web page that you created.
11. Develop a JavaScript to display today's date.
12. Develop simple calculator for addition, subtraction, multiplication and division operation using JavaScript
13. Create HTML Page with JavaScript which takes Integer number as input and tells whether the number is ODD or EVEN.
14. Create HTML Page that contains form with fields Name, Email, Mobile No , Gender , Favorite Color and a button now write a JavaScript code to combine and display the information in textbox when the button is clicked.
15. Implement Validation in above Feedback Form.
16. Use regular expression for validation in Feedback Form.
17. Using ajax retrieve data from a TXT file and display it.
18. Create XML file to store student information like Enrollment Number, Name , Mobile Number , Email Id.
19. Create DTD for above XML File.
20. Create XML Schema for above (Practical No. 18)
21. Create XSL file to convert above (refer Practical No. 17) XML file into XHTML file.
22. Write a php program to display today's date in dd-mm-yyyy format.
23. Write a php program to check if number is prime or not.
24. Write a php program to print first 10 Fibonacci Numbers.
25. Create HTML page that contain textbox, submit / reset button. Write php program to display this information and also store into text file.
26. Write a php script to read data from txt file and display it in html table (the file contains info in format Name: Password: Email)

27 Write a PHP Script for login authentication. Design an html form which takes username and password from user and validate against stored username and password in file.
28 Write PHP Script for storing and retrieving user information from MySql table.
1. Design A HTML page which takes Name, Address, Email and Mobile No. From user (register.php)
29 Store this data in Mysql database / text file.
30 Next page display all user in html table using PHP (display.php)
31 Write a PHP script for user authentication using PHP-MYSQL. Use session for storing username.
32 Using ajax fetch information from a database with AJAX.
33 Students have to create a whole Website which contains above topics in Website.

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**
Steven Holzner,	HTML Black Book		Dremtech press.
Design, Knuckles,	Web Applications : Concepts and Real World		Wiley-India
Reference Books:			
P.J. Deitel & H.M.	Internet and World Wide Web How to program		Deitel Pearson

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1	Computer with moderate configuration
2	XAMPP and other software 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 11**						
B	**1 to 11**	**10**	**10**	**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**
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: M.Sc in IT (Cyber Security) **Subject: Research Methodology and IPR**	
Course Code: MITCS105	**Semester: I**
Duration: 36 Hours	**Maximum Marks:100**
Teaching Scheme	**Examination Scheme**
Theory:**2**	End Semester Exam:**70**
Tutorial: **0**	Attendance: **5**
Practical:	Continuous Assessment:**25**
Credit:**2**	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA

Aim:	
Sl. No.	
1.	Understand research problem formulation.
2.	Analyze research related information
3.	Follow research ethics

Objective:	
Sl. No.	
1	Understand research problem formulation.
2	Analyze research related information
3	Follow research ethics

4.	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5.	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6.	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.
Pre-Requisite:	
Sl. No.	

Contents		**2 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction:** Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.	**6**	**14**
02	**Effective literature studies approaches**: analysis Plagiarism, Research ethics	**6**	**10**
03	**Effective technical writing**: how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.	**6**	**14**
04	**Nature of Intellectual Property:** Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	**6**	**14**
05	**Patent Rights:** Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.	**6**	**14**
06	**New Developments in IPR:** Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.	**6**	**4**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**

Assignments: Based on Theory Lecture.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	**Name of the Publisher**
Stuart Melville and Wayne Goddard	Research methodology: an introduction for science & engineering students		
Ranjit Kumar	Research Methodology: A Step by Step Guide for beginners	2nd Edition	
Reference Books:			
T. Ramappa, S. Chand,	"Intellectual Property Rights Under WTO",	2008	
Robert P. Merges, Peter S. Menell, Mark A. Lemley,	" Intellectual Property in New Technological Age",	2016.	
Asimov,	"Introduction to Design", Prentice Hall,	1962.	
Mayall,	"Industrial Design",		McGraw Hill, 1992.
Halbert,	"Resisting Intellectual Property",		Taylor & Francis Ltd ,2007.
Niebel,	"Product Design",		McGraw Hill, 1974.

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	**1,2,3,4,5,6**			**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**

Name of the Course: M.Sc in IT (Cyber Security) **Subject:** Advanced Operating System			
Course Code: MITCS106A & MITCS196A		**Semester: I**	
Duration: 40 Hours		**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	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	Strong programming skills (Knowledge of C)		
2	Computer architecture		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Operating System Introduction, Structures - Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls, Virtual Machines, System Design and Implementation. Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple Processor Scheduling, Real-Time Scheduling.	**8**	**15**
02	Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.	**7**	**15**

	File System Interface and Implementation ,Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.		
03	Deadlocks - System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock. Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.	**8**	**15**
04	Operating System Security Issues- Introduction to the topic of Security in Operating Systems, Principles of Information Security, Access Control Fundamentals, Generalized Security Architectures.	**7**	**15**
05	Introduction to Distributed systems: Goals of distributed system, hardware and software Concepts, design issues. Elementary introduction to the terminologies within Modern Oss: Parallel, Distributed, Embedded & Real Time, Mobile, Cloud and Other Operating System Models.	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

List of Practical:

Based on theory classes.

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

List of equipment/apparatus for laboratory experiments:

Sl. No.	**Computer with moderate configuration and strong network**

	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	**1,2,3,4,5**	**10**	**10**				
B	**1,2,3,4,5**			**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 Note Book	**10**	
On Spot Experiment(one for each group consisting 5 students)	**40**	
Viva voce	**10**	**60**

Name of the Course: M.Sc in IT (Cyber Security) **Subject:** Advanced DBMS	
Course Code: MITCS106B & MITCS196B	**Semester: I**
Duration: 40 Hours	**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 introduce the fundamental concepts and issues of managing large volume of shared data in a parallel and distributed environment, and to provide insight into related research problems.		
Objective:			
Sl. No.			
1	To learn the design trends in distributed systems.		
2	To apply network virtualization.		
3	Apply remote method invocation and objects.		
Pre-Requisite:			
Sl. No.			
1	Concept of DBMS		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**INTRODUCTION** Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database and computer network concepts **DISTRIBUTED DATABASE MANAGEMENT SYSTEM ARCHITECTURE** Transparencies in a distributed DBMS; Distributed DBMS architecture; Global directory issues	**6**	**10**
02	**DISTRIBUTED DATABASE DESIGN** Alternative design strategies; Distributed design issues; Fragmentation; Data allocation **SEMANTICS DATA CONTROL** View management; Data security; Semantic Integrity Control **QUERY PROCESSING ISSUES** Objectives of query processing; Characterization of query processors; Layers of query processing; Query decomposition; Localization of distributed data	**6**	**10**
03	**DISTRIBUTED QUERY OPTIMIZATION** Factors governing query optimization; Centralized query optimization; Ordering of fragment queries; Distributed query optimization algorithms **TRANSACTION MANAGEMENT** The transaction concept; Goals of transaction management; Characteristics of transactions; Taxonomy of transaction models **CONCURRENCY CONTROL** Concurrency control in centralized database systems; Concurrency control in DDBSs; Distributed concurrency control algorithms; Deadlock management	**6**	**20**
04	**RELIABILITY** Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols	**6**	**10**

05	**PARALLEL DATABASE SYSTEMS** Parallel architectures; parallel query processing and optimization; load balancing	**6**	**10**
06	**ADVANCED TOPICS** Mobile Databases, Distributed Object Management, Multi-databases.	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

List of Practical:

Based on theory classes.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
M.T. Ozsu and P. Valduriez	Principles of Distributed Database Systems		Prentice-Hall
Reference Books			
D. Bell and J. Grimson	Distributed Database Systems		Addison-Wesley

List of equipment/apparatus for laboratory experiments:

Sl. No.	Computer with moderate configuration and strong network connection.
	Oracle

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	**1,2,3,4,5,6**			**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 Note Book		**10**	
On Spot Experiment(one for each group consisting 5 students)		**40**	
Viva voce		**10**	**60**

Name of the Course: M.Sc in IT (Cyber Security) **Subject:** Machine Learning	
Course Code: MITCS106C & MITCS196C	**Semester: I**
Duration: 40 Hours	**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	

Objective:

Sl. No.	
1	To learn the concept of how to learn patterns and concepts from data without being explicitly programmed.
2	To design and analyse various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
3	Explore supervised and unsupervised learning paradigms of machine learning.
4	To explore Deep learning technique and various feature extraction strategies.

Pre-Requisite:

Sl. No.	
1	Concept of Mathematics

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Supervised Learning (Regression/Classification) Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes. Linear models: Linear Regression, Logistic Regression, Generalized Linear Models Support Vector Machines, Nonlinearity and Kernel Methods	**6**	**10**

	Beyond Binary Classification: Multi-class/Structured Outputs, Ranking		
02	Unsupervised Learning Clustering: K-means/Kernel K-means Dimensionality Reduction: PCA and kernel PCA Matrix Factorization and Matrix Completion Generative Models (mixture models and latent factor models)	**6**	**10**
03	Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)	**6**	**20**
04	Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning	**6**	**10**
05	Scalable Machine Learning (Online and Distributed Learning) A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference	**6**	**10**
06	Recent trends in various learning techniques of machine learning and classification methods for various applications.	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

List of Practical:

Based on theory classes.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Kevin Murphy	Machine Learning: A Probabilistic Perspective		MIT Press

Reference Books

Christopher Bishop	Pattern Recognition and Machine Learning		Springer

List of equipment/apparatus for laboratory experiments:

Sl. No.	Computer with moderate configuration and strong network connection.
	Python 3.6, Tensorflow 2.0

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

Group	**Unit**	**Objective Questions** (MCQ only with the	**Subjective Questions**

		correct answer)					
		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**				
	1,2,3,4,5,6						
B	**1,2,3,4,5,6**			**5**	**3**	**5**	
							60
C				**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 Note Book	**10**	
On Spot Experiment(one for each group consisting 5 students)	**40**	
Viva voce	**10**	**60**

Name of the Course: M.Sc in IT (Cyber Security) **Subject:** Computer Graphics and Image Processing	
Course Code: MITCS106D & MITCS196D	**Semester: I**
Duration: 40 Hours	**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 introduce the necessary background, the basic algorithms, and the applications of computer graphics and image processing.

Objective:

Sl. No.	

1	Students are able to learn the fundamentals, advantages and limitations of computer graphics and image processing. Students have knowledge of different raster graphics algorithms.
2	Students are able to develop a program that performs 2D object creation, transformation ,visualization and image enhansment.

Pre-Requisite:

Sl. No.	
1	Concept of coordinate geometry

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to computer graphics and image processing:** History of computer graphics, Vision and displays, Introduction to image processing.	**6**	**10**
02	**Image processing and representation** Color and image representation, Layering and opacity, Filters and computational image processing, Image enhansment.	**6**	**10**
03	**2D Graphics** 2D transformations and projections, Drawing lines, circles and ellipse, Parametric curves.	**6**	**20**
04	**3D Graphics** 3D transformations and projections, Drawing triangles, polygons and surface representation, Parametric surfaces and volumetric representations	**6**	**10**
05	**Lighting and visibility** Hidden surface removal algorithms, Surface shading models, Shadows and advanced shading models.	**6**	**10**
06	**Animation** Basic animation techniques, tweening, double buffering, Dynamic scene representation, Forward and inverse cinematics.	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

List of Practical:

Based on theory classes.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Foley, J.D., van Dam, A., Feiner, S.K. & Hughes, J.F.	Computer graphics: principles and practice		Addison-Wesley
Gonzalez, R.C. & Woods, R.E.	Digital image processing		Addison-Wesley

Reference Books

Donald Hearn & M Pauline Baker	Computer Graphics C Version		
List of equipment/apparatus for laboratory experiments:			
Sl. No.	Computer with moderate configuration and strong network connection.		
	Python 3.6		

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**				
	1,2,3,4,5,6						
B	**1,2,3,4,5,6**			**5**	**3**	**5**	
							60
C				**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 Note Book	**10**	
On Spot Experiment(one for each group consisting 5 students)	**40**	
Viva voce	**10**	**60**

Name of the Course: M.Sc in IT (Cyber Security) **Subject:** Smart Sensors and Internet of Things	
Course Code: MITCS106E & MITCS196E	**Semester: I**
Duration: 40 Hours	**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 understand the vision of IoT from a global context.		
Objective:			
Sl. No.			
1	Able to understand the application areas of IoT		
2	Able to realize the revolution of Internet in Mobile Devices, Cloud and Sensor Networks		
3	Able to understand building blocks of Internet of Things and characteristics		
Pre-Requisite:			
Sl. No.			
1	Concept of basic networking		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Environmental Parameters Measurement and Monitoring: Why measurement and monitoring are important, effects of adverse parameters for the living being for IOT	**6**	**10**
02	Sensors: Working Principles: Different types; Selection of Sensors for Practical Applications, Introduction of Different Types of Sensors such as Capacitive, Resistive, Surface,Acoustic Wave for Temperature, Pressure, Humidity, Toxic Gas etc	**6**	**10**
03	Important Characteristics of Sensors: Determination of the Characteristics Fractional order element: Constant Phase Impedance for sensing applications such as humidity, water quality, milk quality Impedance Spectroscopy: Equivalent circuit of Sensors and Modelling of Sensors Importance and Adoption of Smart Sensors	**6**	**20**
04	Architecture of Smart Sensors: Important components, their features Fabrication of Sensor and Smart Sensor: Electrode fabrication: Screen printing, Photolithography, Electroplating Sensing film deposition: Physical and chemical Vapor, Anodization, Sol-gel	**6**	**10**
05	Interface Electronic Circuit for Smart Sensors and Challenges for Interfacing the Smart Sensor, Usefulness of Silicon Technology in Smart Sensor And Future scope of research in smart sensor	**6**	**10**
06	Recent trends in smart sensor for day to day life, evolving sensors and their architecture.	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of	**4**	**30**

	Semester Examination		
	Total:	**40**	**100**

Practical:

List of Practical:

Based on theory classes.

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Yasuura, H., Kyung, C.-M., Liu, Y., Lin, Y.-L.	Smart Sensors at the IoT Frontier,		Springer International Publishing

Reference Books

Kyung, C.-M., Yasuura, H., Liu, Y., Lin, Y.-L.	Smart Sensors and Systems		Springer International Publishing

List of equipment/apparatus for laboratory experiments:

Sl. No.	

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	**1,2,3,4,5,6**			**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 Note Book		**10**	
On Spot Experiment(one for each group consisting 5 students)		**40**	
Viva voce		**10**	**60**

Name of the Course: M.Sc in IT (Cyber Security) **Subject:** Cloud Computing	
Course Code: MITCS106F & MITCS196F	**Semester: I**
Duration: 40 Hours	**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 explore the basic cloud architecture.
	To analyze the application need and design an infrastructure.
	To extend the cloud capacity understanding the different loop holes.
	To learn the implementation of cloud services

Objective:

Sl. No.	
1	To apply trust-based security model to real-world security problems.
2	An overview of the concepts, processes, and best practices needed to successfully secure information within Cloud infrastructures.
3	Students will learn the basic Cloud types and delivery models and develop an understanding of the risk and compliance responsibilities and Challenges for each Cloud type and service delivery model.

Pre-Requisite:

Sl. No.	
1	Concept of basic networking

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Cloud Computing** Online Social Networks and Applications, Cloud introduction and overview, Different clouds, Risks, Novel applications of cloud computing	**6**	**10**
02	**Cloud Computing Architecture** Requirements, Introduction Cloud computing architecture, On Demand Computing Virtualization at the infrastructure level,	**6**	**10**

	Security in Cloud computing environments, CPU Virtualization, A discussion on Hypervisors Storage Virtualization Cloud Computing Defined, The SPI Framework for Cloud Computing, The Traditional Software Model, The Cloud Services Delivery Model **Cloud Deployment Models** Key Drivers to Adopting the Cloud, The Impact of Cloud Computing on Users, Governance in the Cloud, Barriers to Cloud Computing Adoption in the Enterprise		
03	**Security Issues in Cloud Computing** Infrastructure Security, Infrastructure Security: The Network Level, The Host Level, The Application Level, Data Security and Storage, Aspects of Data Security, Data Security Mitigation Provider Data and Its Security **Identity and Access Management** Trust Boundaries and IAM, IAM Challenges, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud, Cloud Authorization Management	**6**	**20**
04	**Security Management in the Cloud** Security Management Standards, Security Management in the Cloud, Availability Management: SaaS, PaaS, IaaS **Privacy Issues** Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications, U.S. Laws and Regulations, International Laws and Regulations	**6**	**10**
05	**Audit and Compliance** Internal Policy Compliance, Governance, Risk, and Compliance (GRC), Regulatory/External Compliance, Cloud Security Alliance, Auditing the Cloud for Compliance, Security-as-a-Cloud	**6**	**10**
06	**ADVANCED TOPICS** Recent devlopments in hybrid cloud and cloud security.	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

List of Practical:

Based on theory classes.

List of Books

Text Books:

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

John Rhoton	Cloud Computing Explained: Implementation Handbook for Enterprises		
Reference Books			
List of equipment/apparatus for laboratory experiments:			
Sl. No.			

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	**1,2,3,4,5,6**			**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 Note Book	**10**	
On Spot Experiment(one for each group consisting 5 students)	**40**	
Viva voce	**10**	**60**

SEMESTER II					
Code	**Course Title**	**Hours per week**			**Credits**
		L	**T**	**P**	
MITCS201	Program Core V ● Ethical Hacking	3	0	0	3
MITCS202	Program Core VI ● Network Security	3	0	0	3
MITCS203	Program Core VII ● Digital Forensics	3	0	0	3
MITCS204 A/B/C/D/E	Program Elective II A. Security Assessment and Risk Analysis B. Malware Detection C. ML for Security D. Image Processing and Security E. Cloud Computing security	3	0	0	3
MITCS205 A/B/C/D	Audit Course 2	2	0	0	0
MITCS292	Laboratory 1 ● Network Security Lab	0	0	4	2
MITCS293	Laboratory 2 ● Digital Forensics Lab	0	0	4	2
MITCS281	Term Paper with Seminar	0	0	4	2
Total Credits: 18					

***Students be encouraged to go to Industrial Training/Internship for at least 2-3 months during semester break.**

Name of the Course: M.Sc. in IT(Cyber Security) **Subject: Ethical Hacking**	
Course Code: MITCS201	**Semester: II**
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: 40**
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1.	To learn Network Foot printing, Collect System Information, Collect Organization's information
Objective:	

Sl. No.	
1.	To understand Legal aspects of penetration testing
2.	To develop Practical hacking exercise

Pre-Requisite:

Sl. No.	
1.	Basic knowledge of programming

Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction** Key issues plaguing the information security world, incident management process, and penetration testing	**2**	**5**
02	**Footprinting** Various types of footprinting, footprinting tools, and Countermeasures	**2**	**5**
03	**Network Scanning and Enumeration** Network scanning techniques and scanning countermeasures. Enumeration techniques and enumeration countermeasures.	**2**	**10**
04	**Attacks** System hacking methodology, steganography, steganalysis attacks, and covering tracks Different types of Trojans, Trojan analysis, and Trojan Countermeasures. Working of viruses, Virus analysis, computer worms, malware analysis procedure, and countermeasures, Packet sniffing techniques and how to defend against sniffing. Social Engineering techniques, identify theft, and social engineering countermeasures. DoS/DDoS attack techniques, botnets, DDoS attack tools, and DoS/DDoS countermeasures. Session hijacking techniques and countermeasures	**10**	**15**
05	**Web Server Attacks** Different types of web server attacks, attack methodology, and Countermeasures. SQL injection attacks and injection detection tools. Various cloud computing concepts, threats, attacks, and security techniques and tools	**8**	**15**
06	**Cryptography** Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis	**6**	**10**

	tools		
07	**Penetration Testing** Various types of penetration testing, security audit, vulnerability assessment, and penetration testing roadmap	**6**	**10**
	Sub Total:	**40**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Assignments:

Based on lecture

Practical:

- Footprinting and Reconnaissance
- Scanning Networks
- Enumeration
- Vulnerability Analysis
- System Hacking
- Malware Threats
- Sniffing
- Social Engineering
- Denial of Service
- Session Hijacking
- Evading IDS Firewalls and Honeypots
- Hacking Web Servers
- Hacking Web Applications

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Jon Erickson	Hacking: The Art of Exploitation	2nd Edition	No_Starch_Press

Reference Books:

	The_.Basics.of_.Hacking.and_.Penetration.Testing		Syngress

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 7**	**10**	**10**	**5**	**3**	**5**	**60**

B **C**	**1 to 7** **1 to 7**			**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: M.Sc. in IT(Cyber Security) **Subject: Network Security**	
Course Code: MITCS202+ MITCS292	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.	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		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Security in Computing Environment** Need for Security, Security Attack, Security Services, Information Security, Methods of Protection.	**4**	**7**
02	**Basics of Cryptography [3L]** Terminologies used in Cryptography, Substitution Techniques, Transposition Techniques.	**4**	**8**
03	**Encryption and Decryption** Characteristics of Good Encryption Technique, Properties of Trustworthy Encryption Systems, Types of Encryption Systems, Confusion and Diffusion, Cryptanalysis.	**4**	**8**
04	**Key Encryption** Data Encryption Standard (DES) Algorithm, Double and Triple DES, Security of the DES, Advanced Encryption Standard (AES) Algorithm, DES and AES Comparison. Characteristics of Public Key System, RSA Technique, Key Exchange, Diffie-Hellman Scheme, Cryptographic Hash Functions, Digital Signature, Certificates, Certificate Authorities	**4**	**8**
05	**Network Security** Network Concepts, Threats in Networks, Network Security Controls.	**4**	**8**
06	**IP Security** Overview of IP Security (IPSec), IP Security Architecture, Modes of Operation, Security Associations (SA), Authentication Header (AH), Encapsulating Security Payload (ESP), Internet Key Exchange.	**4**	**8**
07	**Web Security** Web Security Requirements, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Electronic Transaction (SET).	**4**	**7**
08	**Electronic Mail Security** Threats to E-Mail, Requirements and Solutions, Encryption for	**4**	**8**

	Secure E-Mail, Secure E-Mail System.		
09	**Firewalls** Firewalls – Types, Comparison of Firewall Types, Firewall Configurations	**4**	**8**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**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
James F. Kurose, Keith W. Ross	Computer Networking – A Top-Down Approach Featuring the Internet	Fifth	Pearson Education
Reference Books:			
William Stallings	Cryptography and network security: principles and practice		Pearson Education
Roberta Bragg, Mark Rhodes-Ousley	Network Security: The Complete Reference		TMH

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 9**	**10**	**10**				
B	**1 to 9**			**5**	**3**	**5**	**60**
C	**1 to 9**			**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: M.Sc. in IT Cyber Security **Subject: Digital Forensics**	
Course Code: MITCS203+ MITCS293	**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.	To provide computer forensics systems
2.	To provide an understanding Computer forensics fundamentals

3.	To analyze various computer forensics technologies		
Objective:			
Sl. No.			
1.	To identify methods for data recovery.		
2.	To apply the methods for preservation of digital evidence.		
Pre-Requisite:			
Sl. No.			
1.	Database System		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Computer Forensics Fundamentals** What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.	**12**	**23**
02	**Evidence Collection and Data Seizure** Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene — Computer Evidence Processing Steps — Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration —Practical Implementation.	**12**	**23**
03	**Computer Forensics analysis and validation** Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, and performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project. Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case	**12**	**24**
	Sub Total:	**36**	**70**

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

Practical:

Skills to be developed:

Intellectual skills:

1. Understand the definition of computer forensics fundamentals
2. Describe the types of computer forensics technology.
3. Analyze various computer forensics systems.
4. Illustrate the methods for data recovery, evidence collection and data seizure.
5. Summarize duplication and preservation of digital evidence.

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**
John R. Vacca	Computer Forensics, Computer Crime Investigation	2nd Edition	Firewall Media, New Delhi
Nelson, Phillips Enfinger, Steuart	Computer Forensics and Investigations		CENGAGE Learning
Reference Books:			
Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison Wesley	Real Digital Forensics		Pearson Education
Tony Sammes and Brian Jenkinson	Forensic Compiling, A Tractitioneris Guide		Springer International edition
Christopher L.T. Brown	Computer Evidence Collection & Presentation		Firewall Media
Jesus Mena	Homeland Security, Techniques & Technologies		Firewall Media
Robert M. Slade	Software Forensics Collecting Evidence from the Scene of a Digital Crime		TMH 2005

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	**Subjective Questions**

		correct answer)					
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A **B** **C**	**1,2,3** **1,2, 3** **1,2,3,**	**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: M.Sc. in IT (Cyber Security) **Subject: Security Assessment and Risk Analysis**	
Course Code: MITCS204A	**Semester: II**
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 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.	**12**	**23**
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	**12**	**24**

	methodology/framework in an organisation.		
	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: M.Sc. in IT (Cyber Security)

Subject: Malware Detection	
Course Code: MITCS204B	**Semester: II**
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.	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, Analyzing Windows programs, Anti-static analysis techniques obfuscation, packing, metamorphism, polymorphism.	**7**	**14**
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	**7**	**14**

	with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching		
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 **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**

Name of the Course: M.Sc. in IT (Cyber Security) **Subject: ML for Security**	
Course Code: MITCS204C	**Semester: II**
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 discuss the relationship between AI/ML and security/privacy;
2.	To identity how AI/ML can be used to launch cyber-attacks;
3.	To identify use cases for incorporating AI/ML for security and trust;
4.	To identify use cases for defining security and trust of AI/ML;

Objective:

Sl. No.	
1.	Identify security requirements and capabilities of AI/ML enabled applications and services;
2.	Identify security requirements and capabilities for security applications and services incorporating AI/ML
3.	Able to identify ways forward for SG17 to undertake in its future study, including potential new work items.

Pre-Requisite:

Sl. No.	
1.	**AI and ML**

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**

01	**Introduction** Overview of information security, current security landscape, the case for security data mining Supervised Learning (Regression/Classification); Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes; Linear models: Linear Regression, Logistic Regression, Generalized Linear Models; Support Vector Machines, Nonlinearity and Kernel Methods; Beyond Binary Classification: Multi-class/Structured Outputs, Ranking	**12**	**23**
02	**Clustering and Learning** Unsupervised Learning Clustering: K-means/Kernel K-means; Dimensionality Reduction: PCA and kernel PCA; Matrix Factorization and Matrix Completion; Generative Models (mixture models and latent factor models);Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests) Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning	**12**	**24**
03	**Advance Learning and Security** Scalable Machine Learning (Online and Distributed Learning) A selection from some other advanced topics, Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference; Anomaly Detection, Evasion Attacks, Membership Inference,Malware Analysis,Model Stealing & Watermarking, Poisoning, Network Traffic Analysis, Generative Adversarial Networks, Differential Privacy,Variational Auto-Encoders	**12**	**23**
	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**
K.P. Soman, R.Loganathan, V.Ajay	Machine Learning with SVM and other Kernel methods		PHI Learning Private Limited,2009.
Shai Shalev-Shwartz, Shai Ben-David	Understanding Machine Learning: From Theory to Algorithms	1 edition	Cambridge University Press;
Reference Books:			
Kevin Murphy	Machine Learning: A Probabilistic Perspective		MIT Press, 2012

Trevor Hastie, Robert Tibshirani, Jerome Friedman	The Elements of Statistical Learning		Springer 2009
Christopher Bishop	Pattern Recognition and Machine Learning		Springer, 2007

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: M.Sc. in IT(Cyber Security) **Subject: Image Processing and Security**	
Course Code: MITCS204D	**Semester: II**
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 learn basic concepts of image processing, fundamentals and mathematical models in digital image and video processing.
2.	To study different types of image transforms for image processing and security.
3.	To develop time and frequency domain techniques for image enhancement.
4.	To understand Image segmentation, restoration, and morphological signal Processing with applications security.

Objective:

Sl. No.	
1.	To develop any image processing application.
2.	To understand the rapid advances in Machine vision.
3.	To learn different techniques employed for the enhancement of images.
4.	Able to learn different causes for image degradation and overview of image restoration techniques.

Pre-Requisite:

Sl. No.	
1.	Basic Mathematics

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Image Representation & Modeling** The Human Eye-Brain System As A Model, Image Formation, Image Models, Basic Image Processing: Sampling and Quantization, Brightness and Colour, Histogram, Filters and Convolution, Frequency Domain Processing, Edge Detection, Boundaries and Line Extraction, Segmentation and Feature Extraction, 2-D Shape Representation and Matching.3-D Representation and Matching, Visual Perception – The Human Eye, How It Works and Fails, Image Hardware and Software – Cameras, Displays, Frame Grabbers, Image Processing Architectures, Image Formation – 2d Image Acquisition and Sampling Theory.	**18**	**35**
02	**Image Transforms** Fourier Transform, Application and Use, Wavelet Trans, Hadamard Cosine Transform, Image Enhancement – Point and Region Operators, Unsharp Masking, Image Compression – Jpeg, Mpeg. Image Restoration – Direct, Inverse, Pseudo-Inverse, Blurring (Spatial Motion), Implementations – Software and Hardware, Image Interpretation – Edge Detection, Feature Extraction, Template Matching, Hough Transform.	**18**	**35**
	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
Feng Liu, Wei Qi Yan	Visual Cryptography for Image Processing and Security: Theory, Methods, and Applications	2nd edition	Springer

Reference Books:

Bernd Jähne	Digital Image	7th edition	Springer

		Processing and Image Formation					
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**	**10**	**10**				
B	**1,2**			**5**	**3**	**5**	**60**
C	**1,2**			**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: M.Sc. in IT(Cyber Security) **Subject: Cloud Computing Security**	
Course Code: MITCS204E	**Semester: II**
Duration: 40 Hours	**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 explore the basic cloud architecture.
	To analyze the application need and design an infrastructure.
	To extend the cloud capacity understanding the different loop holes.
	To learn the implementation of cloud services
Objective:	
Sl. No.	
1	To apply trust-based security model to real-world security problems.
2	An overview of the concepts, processes, and best practices needed to successfully secure information within Cloud infrastructures.
3	Students will learn the basic Cloud types and delivery models and develop an

	understanding of the risk and compliance responsibilities and Challenges for each Cloud type and service delivery model.		
Pre-Requisite:			
Sl. No.			
1	Concept of basic networking		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Cloud Computing** Online Social Networks and Applications, Cloud introduction and overview, Different clouds, Risks, Novel applications of cloud computing	**6**	**10**
02	**Cloud Computing Architecture** Requirements, Introduction Cloud computing architecture, On Demand Computing Virtualization at the infrastructure level, Security in Cloud computing environments, CPU Virtualization, A discussion on Hypervisors Storage Virtualization Cloud Computing Defined, The SPI Framework for Cloud Computing, The Traditional Software Model, The Cloud Services Delivery Model **Cloud Deployment Models** Key Drivers to Adopting the Cloud, The Impact of Cloud Computing on Users, Governance in the Cloud, Barriers to Cloud Computing Adoption in the Enterprise	**6**	**10**
03	**Security Issues in Cloud Computing** Infrastructure Security, Infrastructure Security: The Network Level, The Host Level, The Application Level, Data Security and Storage, Aspects of Data Security, Data Security Mitigation Provider Data and Its Security **Identity and Access Management** Trust Boundaries and IAM, IAM Challenges, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud, Cloud Authorization Management	**6**	**20**
04	**Security Management in the Cloud** Security Management Standards, Security Management in the Cloud, Availability Management: SaaS, PaaS, IaaS **Privacy Issues** Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications, U.S. Laws and Regulations, International Laws and Regulations	**6**	**10**
05	**Audit and Compliance** Internal Policy Compliance, Governance, Risk, and Compliance (GRC), Regulatory/External Compliance, Cloud Security	**6**	**10**

	Alliance, Auditing the Cloud for Compliance, Security-as-a-Cloud		
06	**ADVANCED TOPICS** Recent devlopments in hybrid cloud and cloud security.	**6**	**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**
John Rhoton	Cloud Computing Explained: Implementation Handbook for Enterprises		

Reference Books

List of equipment/apparatus for laboratory experiments:

Sl. No.	

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	**1,2,3,4,5,6**			**5**	**3**	**5**	**60**
C				**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**

SEMESTER III					
Code	**Course Title**	**Hours per week**			**Credits**
		L	**T**	**P**	
MITCS301	Program Core IX • Cyber Law and Cyber Crime Investigation	3	0	0	03
MITCS302	Open Elective • Business Analytics • Project Management & Entrepreneurship • Industrial Safety • Operations Research • Cost Management of Engineering Projects • Security Policy & Audit • Waste to Energy	3	0	0	03
MITCS393	Dissertation-I /Industrial Project	0	0	20	10
Total Credits: 16					

***Students going for Industrial Project/Thesis will complete these courses through MOOCs.**

Name of the Course: **M.Sc. in IT(Cyber Security)** **Subject: Cyber Law & Cyber Crime Investigation**	
Course Code: MITCS301	**Semester: III**
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 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 EvidenceSection 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: M.Sc. in IT(Cyber Security) **Subject: Business Analytics**			
Course Code: MITCS 302A		**Semester: III**	
Duration: 36 Hours		**Maximum Marks:100**	
Teaching Scheme		**Examination Scheme**	
Theory:03		**End Semester Exam:** 70	
Tutorial:0		**Attendance :** 5	
Practical:0		**Continuous Assessment:** 25	
Credit: 03			
Aim:			
Sl. No.			
1.	**Understand the role of business analytics within an organization.**		
2.	**Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.**		
3.	**To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.**		
4.	**To become familiar with processes needed to develop, report, and analyze business data.**		
5.	**Use decision-making tools/Operations research techniques.**		
6	**Mange business process using analytical and management tools.**		
7.	**Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.**		
Objective:			
Sl. No.			
1.	**Students will demonstrate knowledge of data analytics.**		
2.	**Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.**		
3.	**Students will demonstrate the ability to use technical skills in predicative and prescriptive modelling to support business decision-making.**		
4.	**Students will demonstrate the ability to translate data into clear, actionable insights.**		
Pre-Requisite:			
Sl. No.			
1.			
2.			
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Unit1:** **Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive**	**6**	**14**

	advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.		
02	**Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.**	**6**	**14**
03	**Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.**	**6**	**14**
04	**Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.**	**6**	**14**
05	**Decision Analysis: Formulating Decision Problems, Decision Strategies with the without OutcomeProbabilities,Decision Trees, The Value ofInformation, Utility and Decision Making.**	**6**	**10**
06	**Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.**	**6**	**4**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:
Assignments: Based on theory

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Reference Books:			
1.Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey,	**Business analytics Principles, Concepts, and Applications**		**Pearson FT Press.**
2.James Evans,	**Business Analytics**		**persons Education.**

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	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			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: M.Sc. in IT(Cyber Security) **Subject: Industrial Safety**	
Course Code: MITCS 302B	**Semester: III**
Duration: 36 Hours	**Maximum Marks:100**
Teaching Scheme	**Examination Scheme**
Theory:03	**End Semester Exam:** 70

Tutorial:0	**Attendance :** 5
Practical:0	**Continuous Assessment:** 25
Credit: 03	

Aim:	
Sl. No.	
1	**Understand the role of Industrial Safety in an organization.**
2	**Analyze Industrial Safety in various aspect.**
3.	

Objective:	
Sl. No.	
1.	**Mange Industrial Safety using analytical and management tools.**
2.	**To become familiar with processes needed to develop, report, and analyze Industrial Safety data.**
3.	

Pre-Requisite:	
Sl. No.	
1.	**Basic Electrical Knowledge**
2.	

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.	**6**	**14**
02	Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.	**6**	**14**
03	Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.	**6**	**14**
04	Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for	**6**	**14**

	problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.		
05	Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance	**6**	**14**
06			
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Assignments: Based on theory

List of Books
Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Reference Books:			
1.Higgins & Morrow,	**Maintenance Engineering Handbook,**		**Da Information Services.**
2.H. P. Garg,	**Maintenance Engineering,**		**S. Chand and Company.**
3.Audels,	**Pump-hydraulic Compressors,**		**Mcgrew Hill Publication.**
4.Winterkorn, Hans,	**Foundation Engineering Handbook,**		**Chapman & Hall London.**

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

Group	**Unit**	**Objective Questions**	**Subjective Questions**

		(MCQ only with the correct answer)					
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			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: M.Sc. in IT(Cyber Security) **Subject: Operations Research**	
Course Code: MITCS 302C	**Semester: 3rd**
Duration: 36 Hours	**Maximum Marks:100**
Teaching Scheme	**Examination Scheme**
Theory:03	**End Semester Exam:** 70
Tutorial:0	**Attendance :** 5
Practical:0	**Continuous Assessment:** 25
Credit: 03	

Aim:	
Sl. No.	
1.	**Ability to apply the dynamic programming to solve problems of discreet and continuous variables.**
2.	**Students should able to apply the concept of non-linear programming**
Objective:	
Sl. No.	

1.	Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
2.	Students should able to apply the concept of non-linear programming
3.	Students should able to carry out sensitivity analysis
4.	Student should able to model the real world problem and simulate it.
Pre-Requisite:	
Sl. No.	
1.	
2.	

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models	7	14
02	Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming	8	14
03	Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT	7	14
04	Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.	7	14
05	Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game TheorySimulation	7	14
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Assignments: Based on theory

List of Books
Text Books:

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

Reference Books:

1.H.A. Taha,	**Operations Research, An Introduction,**		**PHI, 2008**
2.H.M. Wagner,	**Principles of**		**PHI, Delhi, 1982.**

	Operations Research,		
3.J.C. Pant,	**Introduction to Optimisation: Operations Research,**		**Jain Brothers, Delhi, 2008**
4.Hitler	**Libermann Operations Research**		**McGraw Hill Pub. 2009**
5.Pannerselvam,	**Operations Research**		**Prentice Hall of India 2010**
6.Harvey M Wagner,	**Principles of Operations Research**		**Prentice Hall of India 2010**

List of equipment/apparatus for laboratory experiments:

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	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			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: M.Sc. in IT(Cyber Security) **Subject: Cost Management of Engineering Projects**	
Course Code: MITCS 302D	**Semester: III**
Duration: 36 Hours	**Maximum Marks:100**
Teaching Scheme	**Examination Scheme**
Theory:03	**End Semester Exam:** 70
Tutorial:0	**Attendance :** 5
Practical:0	**Continuous Assessment:** 25
Credit: 03	
Aim:	
Sl. No.	
1.	Understand the role of Cost Management of Engineering Projects.

2.	Analyze data using statistical and data mining techniques and understand relationships between the underlying Cost Management of Engineering Projects.
3.	
Objective:	
Sl. No.	
1.	To gain an understanding of how managers use business analytics to formulate and solve business problems and to support Cost Management of Engineering Projects.
2.	To become familiar with processes needed to develop, report, and analyze Cost Management data.
3.	
Pre-Requisite:	
Sl. No.	
1.	**Basic Management knowledge**
2.	

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction and Overview of the Strategic Cost Management Process	**4**	**4**
02	Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.	**6**	**6**
03	Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non- technical activities.	**6**	**10**
04	Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis.	**8**	**20**
05	Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis.	**3**	
06	Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance	**5**	**20**

	budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.		
07	Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.	**2**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Assignments: Based on theory

List of Books
Text Books:

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

Reference Books:

1.	**Cost Accounting A Managerial Emphasis,**		**Prentice Hall of India, New Delhi**
2. Charles T. Horngren and George Foster,	**Advanced Management Accounting**		
3. Robert S Kaplan Anthony A. Alkinson,	**Management & Cost Accounting**		
4. Ashish K. Bhattacharya,	**Principles & Practices of Cost Accounting A. H.**		**Wheeler publisher**
5. N.D. Vohra,	**Quantitative Techniques in Management,**		**Tata McGraw Hill Book Co. Ltd.**

List of equipment/apparatus for laboratory experiments:

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	ALL	10	10				

B C	ALL ALL			5 5	3 3	5 15	70

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

Examination Scheme for end semester examination:

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

Name of the Course: M.Sc. in IT(Cyber Security) **Subject: Composite Materials**	
Course Code: MITCS 302E	**Semester: III**
Duration: 36 Hours	**Maximum Marks:100**
Teaching Scheme	**Examination Scheme**
Theory:03	**End Semester Exam:** 70
Tutorial:0	**Attendance :** 5
Practical:0	**Continuous Assessment:** 25
Credit: 03	

Aim:	
Sl. No.	
1.	**Understand the role of Composite Materials**
2.	**Analyze various effect of Composite Materials.**
3.	

Objective:	
Sl. No.	
1.	**To gain an understanding Composite Materials**
2.	**To become familiar with processes needed to develop, report, and analyze Composite Materials data.**
3.	

Pre-Requisite:	
Sl. No.	
1.	**Basic chemistry.**
2.	

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and	**7**	**14**

	application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.		
02	REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.	**7**	**14**
03	Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.	**7**	**14**
04	Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.	**8**	**14**
05	Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.	**7**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Assignments: Based on theory

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
1. R.W.Cahn	**Material Science and Technology**	**Vol 13**	**VCH, West Germany.**
2.WD Callister, Jr., Adapted by R. Balasubramaniam,	**Materials Science and Engineering, An introduction.**	**Indian edition, 2007.**	**John Wiley & Sons, NY,**
Reference Books:			
1. Lubin.	**Hand Book of Composite Materials**		

2. K.K.Chawla .	**Composite Materials**		
3. Deborah D.L. Chung.	**Composite Materials Science and Applications**		
4.Danial Gay, Suong V. Hoa, and Stephen W. Tasi.	**Composite Materials Design and Applications**		

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	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			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: M.Sc. in IT(Cyber Security) **Subject:Waste to Energy**	
Course Code:MITCS 302F	**Semester: III**
Duration: 36 Hours	**Maximum Marks:100**
Teaching Scheme	**Examination Scheme**
Theory:03	**End Semester Exam:** 70
Tutorial: 0	**Attendance :** 5
Practical: 0	**Continuous Assessment:** 25
Credit: 03	

Aim:

Sl. No.	
1.	**Understand the role of Waste to Energy.**
2.	**Analyze data how to convert Waste to Energy.**

3.			
Objective:			
Sl. No.			
1.	**To gain an understanding to solve environmental problems and to support Waste to Energy.**		
2.	**To become familiar with processes needed to develop, report, and analyze Waste to Energy.**		
3.			
Pre-Requisite:			
Sl. No.			
1.	**Basic Environmental studies**		
2.			
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors	**7**	**14**
02	Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.	**7**	**14**
03	Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.	**7**	**14**
04	Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.	**7**	**14**
05	Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.	**8**	**14**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**
Practical:			

Assignments: Based on theory

List of Books
Text Books:

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

Reference Books:

1.Desai, Ashok V.,	**Non-Conventional Energy,**		**Wiley Eastern Ltd., 1990.**
2.Khandelwal, K. C. and Mahdi, S. S.,	**Biogas Technology - A Practical Hand Book -**	**Vol. I & II,**	**Tata McGraw Hill Publishing Co. Ltd., 1983.**
3.Challal, D. S.,	**Food, Feed and Fuel from Biomass,**		**IBH Publishing Co. Pvt. Ltd., 1991.**
4.C. Y. WereKo-Brobby and E. B. Hagan,	**Biomass Conversion and Technology,**		**John Wiley & Sons, 1996.**

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	
2.	
3.	
4.	
5.	

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	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			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 to be	Question to be

		question	set	answered
A	**ALL**	**1**	**10**	**10**
B	**ALL**	**5**	**5**	**3**
C	**ALL**	**15**	**5**	**3**

Name of the Course: M.Sc. in IT (Cyber Security) **Subject: Dissertation-I /Industrial Project**	
Course Code: MITCS 393	**Semester: III**
Teaching Scheme	**Examination Scheme100**
Theory:0	End Semester Exam:
Tutorial:0	Teacher's Assessment:0
Practical:20	Internal Assessment:0
Credit:10	Practical Sessional internal continuous evaluation:40
	Practical Sessional external examination:60

Content

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

Relevance to social needs of society
Relevance to value addition to existing facilities in the institute Relevance to industry need
Problems of national importance
Research and development in various domain The student should complete the following:
Literature survey Problem Definition Motivation for study and Objectives
Preliminary design / feasibility / modular approaches Implementation and Verification
Report and presentation

The dissertation stage II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.
Design, fabrication, testing of Communication System.
The viva-voce examination will be based on the above report and work.

Semester-IV					
Code	**Course Title**	**Hours per week**			**Credits**
		L	**T**	**P**	
MITCS491	Dissertation II	0	0	32	16
Total Credits: 16					

Name of the Course: M.Sc. in IT(Cyber Security) **Subject: Dissertation-II**	
Course Code: MITCS 491	**Semester: IV**
Teaching Scheme	**Examination Scheme100**
Theory:0	End Semester Exam:
Tutorial:0	Teacher's Assessment:0
Practical:32	Internal Assessment:0
Credit:16	Practical Sessional internal continuous evaluation:40
	Practical Sessional external examination:60

Guidelines for DissertationPhase–IandII

As per the AICTE directives, the dissertation is a yearlong activity, to be carried out an evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June. The dissertation may be carried out preferably in-house i.e. department's laboratories an centers OR in industry allotted through department's T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.

Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, A record of continuous progress.

Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work