Dr.M.G.R.
Educational and Research Institute
(DEEMED TO BE UNIVERSITY)
(An ISO Certified Institution)
University with Graded Autonomy Status
Maduravoyal , Chennai - 600 095

M.TECH .
CYBER FORENSICS AND INFORMATION SECURITY

CURRICULUM & SYLLABUS

(2020-REGULATION)

MASTER OF TECHNOLOGY

CYBER FORENSICS AND INFORMATION SECURITY

DEPARTMENT
OF
COMPUTER SCIENCE AND ENGINEERING

DECLARATION

I, **Dr. S. GEETHA**, Head of Computer Science and Engineering Department, hereby declare that this copy of the syllabus (M.Tech –Cyber Forensics and Information Security- Full Time 2020 Regulation) is the final version which is being taught in the class and uploaded in our University website. I assure that the Syllabi available in our University website is verified and found correct. The Curriculum and Syllabi have been ratified by our Academic Council / Vice Chancellor.

Date: **Signature**

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DEPARTMENT VISION

To become a Premier Institution of Excellence in Computer Science and Engineering that would develop self-sustaining and globally competent Computer Science and Information Technology Professionals.

DEPARTMENT MISSION

M1. Enable students and faculty with the best of Technologies and Knowledge emerging in the domain of Computer Science and Engineering.
M2. Equip the department laboratories with the power of in-demand Technologies and Software for the On-Demand Industry.
M3. Share and Collaborate knowledge across the IT Industries for holistic development of skilled and talented students.
M4. Impart the students with Ethical values, Critical thinking and Broad based computational skills, to enable students to become Entrepreneurs.
M5. Motivate the students to comprehend problems across Inter Disciplinary Domains and offer innovative solution using ICT.

PROGRAM OUTCOMES

PO1. An understanding of the theoretical foundations and the limits of computing.
PO2. An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently solving problems.
PO3. An ability to design, develop and evaluate new computer based systems for novel applications which meet the desired needs of industry and society.
PO4. Understanding and ability to use advanced computing techniques and tools.
PO5. An ability to undertake original research at the cutting edge of computer science & its related areas.
PO6. An ability to function effectively individually or as a part of a team to accomplish a stated goal.
PO7. An understanding of professional and ethical responsibility.
PO8. An ability to communicate effectively with a wide range of audience.
PO9. An ability to learn independently and engage in lifelong learning.
PO10. An understanding of the impact of IT related solutions in an economic, social and environment context.

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PROGRAM SPECIFIC OUTCOMES

PSO1: Analyze and Evaluate the Cyber Forensics and Information Security needs of an organization. Apply the concepts and theories of information security to various situations, classifying security, analyzing performance and implementing new technologies.

PSO2: Access the Cyber Security risk management policies in order to protect an organization's critical information and assets. Effectively communicate to conduct investigation through referring design models and research in the field of Cyber Forensics and Information security.

PSO3: Measure the performance of security systems within an enterprise-level information system. Troubleshoot, maintain and update an enterprise-level information system.

ADMISSION CRITERIA

This course will offer specialization and hands on practical training with a potential for job placement in IT Industry. Candidates having Bachelor's degree in Engineering / Technology or equivalent in an appropriate area or MSc (Computer Science/Information Technology) or MCA from a recognized Institution and a valid GATE score in CS..

STRUCTURE AND DURATION OF THE COURSE

The total credits for this course will be 68. There are totally 11 theory papers, and 7 laboratory courses and 2 audit courses. The skeleton of course consists of 4 program core papers 5 elective papers, one open elective and Research methodology and IPR paper. Apart from this the student have to study 2 non credit audit courses. The seven laboratory courses includes core and elective labs, mini project with seminar, Dissertation –I/ Industrial Project and Dissertation-II. The entire course is spread over 4 semesters. The following Table represents the skeleton.

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Semester	No. of Theory	Lab	Audit course
I	5	2	1
II	4	3	1
III	2	1	
IV	0	1	
TOTAL	**11**	**7**	**2**

STUDENT ASSESSMENT

Objectives

The primary objective of student assessment is to motivate them for right learning. The secondary objective is to ranking the students according to their academic performances.

Assessment Method

S.No.	Types	Internal Assessment Tests	Weightage	End Semester Examination	Weightage
1.	Theory	T_1 T_2 T_3	50	ET	50
2.	Practical	P_1 P_2	50	EP	50

Average of CAT - 1 and CAT – 2 marks + CAT – 3 marks shall be considered for grading.

Weightage for Internal Assessment

For evaluating the student, the weightage will be given as per the curriculum/scheme of evaluation for the Internal Assessment. The Internal Assessment will be done by way of conducting tests and Assignments. The structure of weightage of Internal Assessment is, 45% weightage for Continuous assessment Examination (CAT- 3), to be conducted at the end of a semester, 40% Weightage for CAT – 1 and CAT – 2 and 15% weightage for Assignment. If a student is not able to write any of the tests due to genuine reasons, the Head of the Department concerned may arrange to conduct a special test and the same may be considered for internal evaluation. However, not more than one such test shall be conducted for a student in a subject for the semester.

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Attendance Requirement for Attending the End Semester Examinations

The teacher handling a subject of study must finalize the attendance percentage and performance report three days prior to the last instruction day of the subject of study in the semester and send it to Head of the Department and Dean. The students falling short of 75% attendance are normally not allowed to write the end semester examinations. However, those students who have less than 75% attendance for reasons of medical and other emergency situations can be considered for condoning of attendance by the Vice Chancellor provided their overall attendance in a subject of study including the period of illness etc., does not fall below 60%. If the attendance falls short due to medical ground backed by medical certificate, up to 5% shortfall can be condoned by the Dean and if it is more than 5%, the Vice Chancellor will have the discretionary power for condoning on a case-to-case basis. The students falling short of 60% attendance have to re-do the courses in the next academic year.

End Semester Examinations

Question papers for end semester examination will be set by External Examiners chosen from a panel of qualified and experienced teachers formed by the Controller of Examinations, under the advice of concerned Heads of the Departments and duly approved by the Vice Chancellor. Question Paper Passing Board will be set up by the Vice Chancellor for reviewing the question papers for end semester examinations.

Valuation of End Semester Examination Answer Papers

For all P.G. courses double valuation will be done; first by the internal faculty and the second by the external faculty. Any discrepancy of more than 15% marks may lead to third valuation and the averages of the nearest two valuation marks will be taken as the theory mark of candidate. For all Practical examinations, an external faculty member will be present for conducting the end semester examination and evaluating the student based on his Practical skills as well as knowledge to be ascertained by viva voce.

Project Evaluation

The continuous assessment carries 50% and is done through three seminar presentations and the end semester examination carries 50% for the report submitted and viva voce. For the final assessment, both internal as well as external faculty should be available for a joint assessment.

Passing Requirement

A candidate shall be declared to have passed the examination, if she/he secures not less than 50% of total marks prescribed for the course/subject of study with a minimum of 50% marks prescribed for the end semester examination, as certified by the result passing board.

A candidate is said to have qualified for the award of degree upon completion of 68 credits stipulated for M. Tech degree.

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M.Tech – Cyber Forensics And Information Security (Full Time)

Curriculum and Syllabus 2020 Regulation
To be implemented from 2020-2021 Batch

I SEMESTER							
S.No	**Sub.Code**	**Title of Subject**	**TY/ LB/ETL**	**L**	**T**	**P**	**C**
1	MMA20I009	Mathematics For Information Security and Cyber Forensics	Ty	3	0	0	3
2	MCS20I001	Digital Forensics	Ty	3	0	0	3
3	MCS20IEXX	Elective-1	Ty	3	0	0	3
4	MCS20IEXX	Elective-2	Ty	3	0	0	3
5	MET20RM01	Research Methodology and IPR	Ty	2	0	0	2
6	MET20AUXX	Audit Course-I	Ty	2	0	0	0
7	MCS20IL01	Digital Forensics Lab	Lb	0	0	4	2
8	MCS20IELX	Elective-1 Lab	Lb	0	0	4	2
		Total		16	0	8	18

II SEMESTER							
S.No	**Sub.Code**	**Title of Subject**	**TY/ LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20C002	Advanced Algorithms	Ty	3	0	0	3
2	MCS20C003	Soft Computing	Ty	3	0	0	3
3	MCS20IEXX	Elective-3	Ty	3	0	0	3
4	MCS20IEXX	Elective-4	Ty	3	0	0	3
5	MET20AUXX	Audit Course II	Ty	2	0	0	0
6	MCS20CL02	Advanced Algorithm Lab	Lb	0	0	4	2
7	MCS20IELX	Elective-4 Lab	Lb	0	0	4	2
8	MCS20IL02	Mini Project with Seminar	Lb	2	0	0	2
		Total		16	0	8	18

L : Lecture T : Tutorial SLr : Supervised Learning P: Practical R : Research C : Credits
Ty/Lb/ETL : Theory / Lab / Embedded Theory and Lab

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III SEMESTER							
S.No	**Sub.Code**	**Title of Subject**	**TY/ LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IEXX	Elective-5	Ty	3	0	0	3
2	MET20OEXX	Open Elective	Ty	3	0	0	3
3	MCS20IL03	Dissertation-I	Lb	0	0	20	10
		Total		**6**	**0**	**20**	**16**

IV SEMESTER							
S.No	**Sub.Code**	**Title of Subject**	**TY/ LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IL04	Dissertation-II	Lb	0	0	32	16
		Total		**0**	**0**	**32**	**16**

Summary of Credits:

Semester	Credits
I	18
II	18
III	16
IV	16
TOTAL	**68**

Theory and Lab Details

Semester	No. of Theory	Lab	Audit course
I	5	2	1
II	4	3	1
III	2	1	-
IV	0	1	-
TOTAL	**11**	**7**	**2**

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Elective I							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE01	Vulnerability Assessment and Penetration Testing	Ty	3	0	0	3
L1	MCS20IEL1	Vulnerability Assessment and Penetration Testing Lab	Lb	0	0	4	2
2	MCS20IE02	Applied Cryptology	Ty	3	0	0	3
L2	MCS20IEL2	Applied Cryptology Lab	Lb	0	0	4	2
3	MCS20IE03	Secured programming	Ty	3	0	0	3
L3	MCS20IEL3	Secured programming Lab	Lb	0	0	4	2

Elective II							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE04	Basics of Forensics Psychology	Ty	3	0	0	3
2	MCS20IE05	Operating System Security	Ty	3	0	0	3
3	MCS20IE06	Advanced Computer Networks and Security	Ty	3	0	0	3

Elective III							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE07	Information Security	Ty	3	0	0	3
2	MCS20IE08	Cyber law and IPR	Ty	3	0	0	3
3	MCS20IE09	Biometrics	Ty	3	0	0	3

Elective IV							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE10	Information Security Audit	Ty	3	0	0	3
L1	MCS20IEL10	Information Security Audit Lab	Lb	0	0	4	2
2	MCS20IE11	Cyber Crime Investigation	Ty	3	0	0	3
L2	MCS20IEL11	Cyber Crime Investigation Lab	Lb	0	0	4	2
3	MCS20IE12	Data Privacy	Ty	3	0	0	3
L3	MCS20IEL12	Data Privacy Lab	Lb	0	0	4	2

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Elective V							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE13	Database Design Security	Ty	3	0	0	3
2	MCS20IE14	Web Security	Ty	3	0	0	3
3	MCS20IE15	Malware Analysis	Ty	3	0	0	3

Audit Course I & II							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MET20AU01	English for Research Paper Writing	Ty	2	0	0	0
2	MET20AU02	Disaster Management	Ty	2	0	0	0
3	MET20AU03	Sanskrit for Technical Knowledge	Ty	2	0	0	0
4	MET20AU04	Value Education	Ty	2	0	0	0
5	MET20AU05	Constitution of India	Ty	2	0	0	0
6	MET20AU06	Pedagogy Studies	Ty	2	0	0	0
7	MET20AU07	Stress Management by Yoga	Ty	2	0	0	0
8	MET20AU08	Personality Development through life Enlightenment Skills	Ty	2	0	0	0

Open Electives							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MET20OE01	Business Analytics	Ty	3	0	0	3
2	MET20OE02	Industrial Safety	Ty	3	0	0	3
3	MET20OE03	Operations Research	Ty	3	0	0	3
4	MET20OE04	Cost Management of Engineering Projects	Ty	3	0	0	3
5	MET20OE05	Composite Materials	Ty	3	0	0	3
6	MET20OE06	Waste to Energy	Ty	3	0	0	3

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CYBER FORENSICS AND INFORMATION SECURITY

SEMESTER I

I Year M.Tech Full Time 2020 Regulation Curriculum & Syllabus

DEPARTMENT OF COMPUTER SCIENCE

Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MMA20I009	Mathematics for Information Security and Cyber Forensics	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Apply the Basic concepts in Algebra
- Use the Basic concepts in Combinatorics
- Identify and solve problems in Mathematical logic
- Understand the Basic concepts in Graphs and Matrix Representation
- Apply the Basic concepts in Trees

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Demonstrate knowledge of Basic concepts of Mathematics science & Engineering mathematics (L1,L2,L3)
CO2	Calculate the required parameters using basic mathematical principles, and formulae (L2,L3,L4)
CO3	Apply mathematical techniques to solve problems (L2,L3,L4)
CO4	Examine the relevant graphs, and techniques to provide solutions(L1,L2,L3,L4)
CO5	Examine the trees and properties to use real time problems for accurate results(L3,L4)

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	1	2	2	1	-	3	3
CO2	3	3	1	2	3	1	1	-		1
CO3	3	3	2	2	3	2	1	-	2	3
CO4	3	3	2	2	1	2	1	1	2	3
CO5	3	3	2	2	2	2	1	1	2	2

COs/PSOs	PSO1	PSO2	PSO3
CO1	1	3	2
CO2	1	3	2
CO3	2	3	2
CO4	2	3	2
CO5	2	3	2

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
	✓								

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MMA20I009	Mathematics for Information Security and Cyber Forensics	Ty	3	0	0	3

UNIT I INTRODUCTION TO ABSTRACT ALGEBRA 9 Hrs

Groups (Definition and Examples) – Subgroups – Permutation groups – Homomorphism – Kernel – Cosets – Lagrange's theorem – Rings – Fields (Definition and Examples).

UNIT II COMBINATORICS 9 Hrs

Mathematical Induction – Pigeon Hole Principle – Principle of Inclusion and Exclusion – Recurrence Relations – Generating Functions.

UNIT I MATHEMATICAL LOGIC 9 Hrs

Statements – Truth Table – Connectives – Normal Forms – Predicate Calculus – Inference Theory.

UNIT IV DISCRETE STRUCTURES I 9 Hrs

Basic concepts of Graphs – Sub graphs – Paths and Circuits – Matrix representation of Graphs – Graph Isomorphism – Connected graphs and Components – Euler and Hamiltonian paths – Travelling salesman problem.

UNIT V DISCRETE STRUCTURES II 9 Hrs

Basic concepts of Trees– Properties – Pendant vertices – Rooted and Binary trees – Spanning trees – Fundamental circuits – Finding all spanning trees of a graph – Spanning trees in a weighted graph.

Total Hours: 45

Reference Books:

1) Tremblay J.P., Manohar R., *Discrete Mathematical structures with applications to Computer science*, Tata McGraw Hill Publishing Co., (2017).
2) Kenneth Rosen, *Discrete Mathematics and its applications (SIE)*, Tata McGraw Hill Publishing Co., (2016).
3) John C. Martin, *Introduction to languages and the theory of computation (3rd ed.)*, Mcgraw Hill, (2018).
4) Hopcroft J.E., Ullman J.D., *Introduction to Automata theory, Languages and Computation*, Narosa Publishing house, (2018).
5) Narsingh Deo, *Graph theory with applications to Engineering and Computer Science*, Prentice Hall of India, (2018).
6) Robin J. Wilson, *Introduction to Graph theory (4th ed.)*, Pearson, (2018).

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20I001	Digital Forensics	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Understand the languages of digital forensics ,and the investigation of digital crime scene
- Learn the basics of computer investigators
- Become knowledgeable in the digital forensics networks and OSI layers

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understanding the digital forensics
CO2	Can conduct the investigate and recover the data in digital forensics.
CO3	Will have the knowledge in offending and secure the evidence
CO4	Analyze the knowledge to investigate through the digital evidence
CO5	To Apply network investigation.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**1**
CO3	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**2**	**2**	**1**
CO3	**2**	**2**	**2**
CO4	**3**	**2**	**2**
CO5	**2**	**3**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
				✓					

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20I001	Digital Forensics	Ty	3	0	0	3

UNIT I DIGITAL FORENSICS 9 Hrs

Foundations of Digital Forensics–

Language of computer crime investigation - digital evidence in the court room- Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication, Discovery of Electronic Evidence – Identification of Data – Reconstructing Past Events.

UNIT II DIGITAL INVESTIGATION 9 Hrs

Conducting digital investigation – Handling the digital crime scene -investigate reconstruction - Steganography, Data Acquisition and Duplication, Recovering Deleted files and Deleted Partitions,

Image file forensics

UNIT III APPREHENDING OFFENDERS 9 Hrs

Violent crime and digital evidence – digital evidence as alibi – Sex offenders on the Internet- Computer intrusions- Cyber stalking.

UNIT IV EVIDENCE MANAGEMENT 9 Hrs

Computer basics for digital investigators – applying forensic science to computers –Digital Evidence on windows system-digital evidence on UNIX system, Digital evidence on Macintosh system, Digital evidence on mobile devices.

UNIT V NETWORKS INVESTIGATION 9 Hrs

Networks basics for digital investigators – applying forensic science to networks – digital evidence on the internet - digital evidence on physical and Data - link layers - digital evidence on network and transport layers

Total Hours: 45

REFERENCES:

1. *Digital Evidence and Computer Crime Forensic science, Computers and Internet - Eoghan Casey Elsevier Academic Press –Third Edition*
2. *A Electronic Discovery and Digital Evidence in a Nut Shell-Shira A scheindlin, Daniel J Capra, The*
3. *Sedona Conference-Academic Press-Third Edition*
4. *Cyber Forensics: Understanding Information Security Investigations (Springer's Forensic Laboratory Science Series) by Jennifer Bayuk , 2010.*
5. *Handbook of Digital and Multimedia Forensic Evidence John J. Barbara*
6. *Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers& IT Security Experts Ali Jahangiri October, 2009.*

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEXX	Elective-1	Ty	3	0	0	3

Choose any one of the subject in the following table

Elective 1							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE01	Vulnerability Assessment and Penetration Testing	Ty	3	0	0	3
L1	MCS20IEL1	Vulnerability Assessment and Penetration Testing Lab	Lb	0	0	4	2
2	MCS20IE02	Applied Cryptology	Ty	3	0	0	3
L2	MCS20IEL2	Applied Cryptology Lab	Lb	0	0	4	2
3	MCS20IE03	Secured programming	Ty	3	0	0	3
L3	MCS20IEL3	Secured programming Lab	Lb	0	0	4	2

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEXX	Elective-2	Ty	3	0	0	3

Choose any one of the subject in the following table

Elective 2							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE04	Basics of Forensics Psychology	Ty	3	0	0	3
2	MCS20IE05	Operating System Security	Ty	3	0	0	3
3	MCS20IE06	Advanced Computer Networks and Security	Ty	3	0	0	3

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Subject Code: MET20RM01	Subject Name : Research Methodology and IPR	Ty/Lb/ ETL	L	T/SLr	P/R	C
	Prerequisite: core subjects	Ty	2	0	0	2

Ty/Lb/ : Theory/Lab L : Lecture T : Tutorial P : Practical/Project R : Research C: Credits T/L Theory/Lab

OBJECTIVE: The goal is to emphasize the importance of innovation and creativity by understanding the research concepts and ethics which will aid to build the nation IPR status.

COURSE OUTCOMES (COs) : By doing this course students will

CO1	Understand research problem formulation by Analyzing research related information and its execution by following research ethics
CO2	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CO3	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
CO4	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.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	3	3	3	2	3	3	2	2
CO2	2	3	3	3	3	2	3	3	2	2
CO3	2	3	3	3	3	2	3	3	2	2
CO4	2	3	3	3	3	2	3	3	2	2

COs / PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3
CO4	3	3	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												

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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MET20RM01	Research Methodology and IPR	Ty	2	0	0	2

UNIT 1:SELECTION, ANALYSIS AND STATEMENT OF THE RESEARCH PROBLEM; 6 hrs

Literature Review and Formulation of Objectives – using the following Critical thinking Skills – Drawing a Concept map, Oral Communication, Debating, Questioning, Collaborating, Evaluation and Reasoning.

UNIT 2 :RESEARCH DESIGN 6 hrs

Types of Study, Types of Data, Measures of Variablility, Setting up the Hypotheses, data collection techniques and tools, sampling, Describing data – Charts and graphs ; Data processing – Categorization, coding, summarization.

UNIT 3: DATA ANALYSIS AND REPORT WRITING: 6 hrs

Statisticalmeasures, Regression and correlation, significance test; Report writing – Purpose, format, content, editing and evaluation. Using Citation tools; Report for specific purposes – Theses, Journals, Grant application. Oral presentation to an audience; use of project management digital tools and plagiarism checking.

UNIT 4 :INTRODUCTION TO INTELLECTUAL PROPERTY 6 hrs

Types of intellectual property rights – Patent, Copyright, Trade Mark, Industrial Design, Geographical Indication, Trade Secrets - Traditional Knowledge. Elements of Patentability - Novelty, Non Obviousness (Inventive Steps), Industrial Application – Non patentable inventions – Process of patenting – National and International – Form and Fees for IP India

UNIT 5:PRIOR ART SEARCH, PATENT DRAFTING 6 hrs

Drafting patent Claims – Types of claims - Registration Procedure, Rights and Duties of Patentee; Patent infringement; Licensing – Franchising - Joint ventures; Non-Disclosure Agreements (NDAs) - Material Transfer Agreements (MTAs).

Total Number of Hours: 30

References:

- C. Vijayalakshmi and C. Sivapragasam (2011) Research Methods – Tips and Techniques, , MJP Publishers
- Deboraj Rumsey (2010) Statistics Essentials for Dummies, Wiley Publishing Incorporated
- Bouchoux (2013) Intellectual Property, DELMAR CENGAGE Learning, USA
- V K Ahuja (2017) Law Relating to Intellectual Property Rights, LexisNexis Butterworths India

IMPORTANT WEB LINKS

- https://www.wipo.int/portal/en/index.html
- http://ipindia.nic.in/
- https://www.epo.org
- https://www.uspto.gov

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AUXX	Audit course-I	Ty	2	0	0	0

Choose any one of the subject in the following table

Audit Course I & II							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MET20AU01	English for Research Paper Writing	Ty	2	0	0	0
2	MET20AU02	Disaster Management	Ty	2	0	0	0
3	MET20AU03	Sanskrit for Technical Knowledge	Ty	2	0	0	0
4	MET20AU04	Value Education	Ty	2	0	0	0
5	MET20AU05	Constitution of India	Ty	2	0	0	0
6	MET20AU06	Pedagogy Studies	Ty	2	0	0	0
7	MET20AU07	Stress Management by Yoga	Ty	2	0	0	0
8	MET20AU08	Personality Development through life Enlightenment Skills	Ty	2	0	0	0

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IL01	Digital Forensics Lab	Lb	0	0	4	2

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To introduce students to Scientific , philosophy, integrity, scene investigation procedures, criminalities, and the role of the criminalist as they relate to digital crime scene investigation
- Demonstrate use of digital forensics tools.
- Guide a digital forensics exercise.
- Recognize the state of the practice and the gaps in technology, policy, and legal issues

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Practices and basic knowledge about VMware and various file system.
CO2	Show in Open source forensics tools
CO3	Express in tracing concepts
CO4	To demonstrate Investigation attacks
CO5	To deal real time cyber security issues.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**2**	**2**	**1**	**3**	**1**	**1**	**2**	**2**	**2**	**3**
CO2	**2**	**1**	**2**	**3**	**1**	**1**	**2**	**2**	**2**	**3**
CO3	**2**	**1**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**3**
CO4	**2**	**2**	**3**	**3**	**2**	**1**	**2**	**1**	**3**	**3**
CO5	**2**	**2**	**3**	**3**	**2**	**1**	**2**	**1**	**3**	**3**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**1**	**2**	**1**
CO2	**1**	**2**	**2**
CO3	**1**	**2**	**2**
CO4	**1**	**2**	**1**
CO5	**1**	**2**	**1**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
							√		

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IL01	Digital Forensics Lab	LB	0	0	4	2

The students will learn many of the cardinal principles and techniques of digital crime scene investigation. The necessity of a rigorous scientific approach will be stressed. This lab uses an intensive, hands-on style to learn the basics of digital crime scene management and the recognition, evaluation, enhancement, documentation, control, and collection of evidence. Scenes will encompass criminal and non-criminal activities including Computer Intrusions, Cyber stalking, violent crime, and crime committed using Mobile devices and Network Related crimes

The primary aim of the course is to introduce students to scientific, philosophy, integrity, scene investigation procedures, criminalities, and the role of the criminalist as they relate to digital crime scene investigation

Students will be introduced to:

- Documentation with notes, sketches, and photography
- Specialized techniques for the recognition and enhancement of physical evidence
- Preparation and maintenance of case folders for records including notes, sketches, photographs, and Contacts/communications.
- Communication of results and preparation formal, typewritten reports
- Management of scenes and available resources including equipment and personnel Mock crime
- Scenes will be used for demonstrations and to assess knowledge, skills, and abilities of students.
- Conducting Digital Investigation and Investigative reconstruction with Digital Evidence. Modus Operandi, Motive and Technology.

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IELX	Elective-1 lab	Lb	0	0	4	2

Choose respective Lab subject in the following table

Elective 1							
S.No	**Sub.Code**	**Title of Subject**	**Ty /Lb/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE01	Vulnerability Assessment and Penetration Testing	Ty	3	0	0	3
L1	MCS20IEL1	Vulnerability Assessment and Penetration Testing Lab	Lb	0	0	4	2
2	MCS20IE02	Applied Cryptology	Ty	3	0	0	3
L2	MCS20IEL2	Applied Cryptology Lab	Lb	0	0	4	2
3	MCS20IE03	Secured programming	Ty	3	0	0	3
L3	MCS20IEL3	Secured programming Lab	Lb	0	0	4	2

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20C002	Advanced Algorithms	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Explain the graph, algorithm and computations
- Explain Quick sort ,Merge sort algorithm, BFS and DFS algorithms
- Explain the backtracking algorithm for the N-queens problem.
- To Understand Shortest path in graphs
- To Understand the types of algorithm and solve paradigms .

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the fundamentals of algorithms
CO2	Evaluate the algorithms
CO3	To clear up troubles the usage of set of rules design methods including the grasping approach, divide and overcome, dynamic programming and backtracking .
CO4	Analysing the shortest path in graphs and solving the problem
CO5	Evaluate the algorithm and applying the proposed data structures.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**2**	**2**	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**3**
CO2	**3**	**1**	**2**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO3	**1**	**2**	**2**	**3**	**1**	**2**	**2**	**2**	**1**	**2**
CO4	**2**	**2**	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**3**
CO5	**3**	**1**	**2**	**3**	**3**	**2**	**2**	**2**	**1**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**2**	**1**	**2**
CO2	**2**	**1**	**2**
CO3	**1**	**2**	**2**
CO4	**2**	**1**	**1**
CO5	**1**	**2**	**1**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
				√					

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20C002	Advanced Algorithms	Ty	3	0	0	3

UNIT–I **9Hrs**

Sorting: Review of various sorting algorithms, topological sorting, **Graph:** Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

UNIT-II **9Hrs**

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

UNIT-III **9Hrs**

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm. **Matrix Computations:** Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

UNIT-IV **9Hrs**

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming - **Modulo Representation of integers/ polynomials:** Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm

UNIT-V **9Hrs**

Linear Programming: Geometry of the feasibility region and Simplex algorithm **NP-completeness:** Examples, proof of NP-hardness and NP-completeness. Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm. Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures

Total Hours: 45

Reference Books:

1. "Introduction to Algorithms", Cormen, Leiserson, Rivest, Stein, 4th edition, McGraw Hill,
2. "The Design and Analysis of Computer Algorithms" Aho, Hopcroft, Ullman.
3. "Algorithm Design" Kleinberg and Tardos.

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Subject Code	Subject Name : Soft Computing	Ty/Lb/ETL	L	T	P	C
MCS20C003		Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Understand the features of soft computing.
- Understand the operations of fuzzy sets
- To solve the problem using neural network techniques
- Analyze Machine Learning approach
- Understand the deep learning & implementation of computing technique..

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Identify and describe fuzzy and soft computing techniques and also their use in some real life situations
CO2	Discuss fuzzy sets and operations on Fuzzy sets
CO3	To solve the problems using neural networks techniques.
CO4	Using machine learning technique to find solution
CO5	Using deep learning to solve the problems

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**1**
CO2	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**
CO4	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**
CO2	**3**	**3**	**2**
CO4	**3**	**3**	**2**
CO5	**3**	**3**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
				√					

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20C003	Soft Computing	Ty	3	0	0	3

UNIT-I **9 Hrs**

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics

UNIT - II **9 Hrs**

FUZZY LOGIC: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT –III **9 Hrs**

NEURAL NETWORKS: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks: Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks

UNIT - IV **9 Hrs**

GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.

UNIT -V **9 Hrs**

Matlab/Python Lib: Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

Reference Books: **Total Hours : 45**

1. Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, Neuro:Fuzzy and Soft Computing, Prentice:Hall of India, 2003.
2. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic:Theory and Applications, Prentice Hall, 1995.
3. MATLAB Toolkit Manual

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Subject Code	Subject Name		Ty/Lb/ETL	L	T	P	C
MCS20IEXX	Elective-3		Ty	3	0	0	3

Choose any one of the subject in the following table

Elective 3							
S.No	**Sub.Code**	**Title of Subject**	**Ty /Lb/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE07	Information Security	Ty	3	0	0	3
2	MCS20IE08	Cyber law and IPR	Ty	3	0	0	3
3	MCS20IE09	Biometrics	Ty	3	0	0	3

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEXX	Elective-4	Ty	3	0	0	3

Choose any one of the subject in the following table

Elective 4							
S.No	**Sub.Code**	**Title of Subject**	**Ty /Lb/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE10	Information Security Audit	Ty	3	0	0	3
L1	MCS20IEL10	Information Security Audit Lab	Lb	0	0	4	2
2	MCS20IE11	Cyber Crime Investigation	Ty	3	0	0	3
L2	MCS20IEL11	Cyber Crime Investigation Lab	Lb	0	0	4	2
3	MCS20IE12	Data Privacy	Ty	3	0	0	3
L3	MCS20IEL12	Data Privacy Lab	Lb	0	0	4	2

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AUXX	Audit course-II	Ty	2	0	0	0

Choose any one of the subject in the following table

Audit Course I & II							
S.No	**Sub.Code**	**Title of Subject**	**Ty /Lb/ETL**	**L**	**T**	**P**	**C**
1	MET20AU01	English for Research Paper Writing	Ty	2	0	0	0
2	MET20AU02	Disaster Management	Ty	2	0	0	0
3	MET20AU03	Sanskrit for Technical Knowledge	Ty	2	0	0	0
4	MET20AU04	Value Education	Ty	2	0	0	0
5	MET20AU05	Constitution of India	Ty	2	0	0	0
6	MET20AU06	Pedagogy Studies	Ty	2	0	0	0
7	MET20AU07	Stress Management by Yoga	Ty	2	0	0	0
8	MET20AU08	Personality Development through life Enlightenment Skills	Ty	2	0	0	0

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20CL02	Advanced Algorithms Lab	Ty	0	0	4	2

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To Learn the algorithm and computations
- To understand the different matching technique
- To understand the flow networks theorem and algorithms
- To Understand Shortest path in graphs
- To Understand the types of algorithm and solve paradigms .

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the fundamentals of algorithms
CO2	Evaluate the matching through algorithm
CO3	Describe and implement algorithms for basic mathematical problems.
CO4	Analysing the shortest path in graphs and solving the problem
CO5	Evaluate the algorithm and applying the proposed data structures.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**2**	**2**	**1**	**1**	**1**	**2**	**1**	**1**
CO2	**3**	**3**	**3**	**1**	**2**	**1**	**2**	**2**	**3**	**2**
CO3	**3**	**2**	**2**	**2**	**3**	**2**	**1**	**2**	**3**	**1**
CO4	**2**	**3**	**3**	**3**	**2**	**1**	**2**	**1**	**1**	**1**
CO5	**2**	**3**	**3**	**3**	**2**	**1**	**1**	**1**	**2**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**
CO2	**3**	**3**	**1**
CO3	**3**	**2**	**2**
CO4	**3**	**3**	**1**
CO5	**3**	**3**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
							√		

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20CL02	Advanced Algorithms lab	TY	0	0	4	2

List of Experiments:

1. Summary/recap on complexity and NP-complete problems.
2. Dynamic programming: characterization, diverse problems.
3. Greedy algorithms: characterization, diverse problems.
4. Methods for solving NP-complete problems (branch and bound, graph exploration, heuristics based greedy/random/optimization approaches)
5. Knapsack Problem using Greedy Solution
6. Travelling Salesman Problem
7. Find Minimum Spanning Tree using Kruskal's Algorithm
8. N Queen Problem using Backtracking.
9. Insertion sort
10. Quick Sort

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IELX	Elective-4 lab	TY	0	0	4	2

Choose any one of the subject in the following table

Elective 4							
S.No	**Sub.Code**	**Title of Subject**	**Ty /Lb/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE10	Information Security Audit	Ty	3	0	0	3
L1	MCS20IEL10	Information Security Audit Lab	Lb	0	0	4	2
2	MCS20IE11	Cyber Crime Investigation	Ty	3	0	0	3
L2	MCS20IEL11	Cyber Crime Investigation Lab	Lb	0	0	4	2
3	MCS20IE12	Data Privacy	Ty	3	0	0	3
L3	MCS20IEL12	Data Privacy Lab	Lb	0	0	4	2

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Subject Code : MCS20IL02	**Subject Name :** Mini Project with Seminar	**Ty/Lb/ETL**	**L**	**T**	**P**	**C**
	Prerequisite :	Lb	2	0	0	2

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- To acquire hands-on experience in converting a novel idea / technique into a working model / prototype involving multi-disciplinary skills and / or knowledge and working in at team.

COURSE OUTCOMES (Cos) :

Students completing the course were able to

CO1	To conceptualize a novel idea / technique into a product
CO2	To develop a multi-disciplinary thinking and enable teamwork
CO3	Ideate and develop a prototype

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	**3**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**3**	**3**
CO2	**2**	**1**	**2**	**2**	**1**	**1**	**3**	**3**	**2**	**1**
CO3	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**3**	**3**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	2	1	1
CO2	1	2	1
CO3	1	2	1

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
							✓		

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IL02	Mini project	Lb	2	0	0	2

1 Find your domain of interest and perform an in depth study on the articles of your domain.

2 Analyze and categorize executable project modules after considering risks.

3 Choose efficient tools for designing project modules.

4 Combine all the modules through effective work after efficient testing.

5 Elaborate the completed task and compile the project report and PPT slides

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Semester 3

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEXX	Elective-5	Ty	3	0	0	3

Choose any one of the subject in the following table

Elective 5							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MCS20IE13	Database Design Security	Ty	3	0	0	3
2	MCS20IE14	Web Security	Ty	3	0	0	3
3	MCS20IE15	Malware Analysis	Ty	3	0	0	3

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20OEXX	Open elective	Ty	3	0	0	3

Choose any one of the subject in the following table

Open Electives							
S.No	**Sub.Code**	**Title of Subject**	**TY /LB/ETL**	**L**	**T**	**P**	**C**
1	MET20OE01	Business Analytics	Ty	3	0	0	3
2	MET20OE02	Industrial Safety	Ty	3	0	0	3
3	MET20OE03	Operations Research	Ty	3	0	0	3
4	MET20OE04	Cost Management of Engineering Projects	Ty	3	0	0	3
5	MET20OE05	Composite Materials	Ty	3	0	0	3
6	MET20OE06	Waste to Energy	Ty	3	0	0	3

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IL03	Project phase-I	Lb	0	0	20	10

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- The objective of the Main Project is to culminate the academic study and provide an opportunity to explore a problem or issue , address through focused and applied research under the direction of a faculty mentor. The project demonstrates the student's ability to synthesize and apply the knowledge and skills acquired to real-world issues and problems. This project affirms the students to think critically and creatively, find an optimal solution, make ethical decisions and to present effectively.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Apply the knowledge and skills acquired in the course of study addressing a specific problem or issue.
CO2	To encourage students to think critically and creatively about societal issues and develop user friendly and reachable solutions
CO3	To refine research skills and demonstrate their proficiency in communication skills.
CO4	To take on the challenges of teamwork, prepare a presentation and demonstrate the innate talents.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**1**	**2**	**3**	**1**	**1**	**2**	**2**	**2**	**2**
CO2	**2**	**2**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**2**
CO3	**1**	**2**	**3**	**2**	**2**	**2**	**1**	**1**	**3**	**1**
CO4	**3**	**1**	**2**	**3**	**1**	**1**	**2**	**2**	**2**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**2**	**1**	**1**
CO2	**1**	**2**	**1**
CO3	**2**	**1**	**1**
CO4	**2**	**1**	**1**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IL03	Project phase-I	Lb	0	0	20	10

- Find your domain of interest and perform an in depth study on the articles of the domain.
- Obtain updated knowledge through Literature Survey in reputed Journals
- Review and finalize the title by various approaches. The title should reflect problem identification, domain name, technology applied etc.
- Review and finalize the approach to the problem identified.
- Prepare a detailed action for conducting investigation including team work.
- Perform detailed Analysis / Modeling / Simulations / Design / Problem solving / Experiments as needed.
- Categorize executable project modules after considering risks and choose efficient tools for designing project modules.
- Elaborate the completed task and compile the work in PPT slides

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IL04	Project phase-II	Lb	0	0	32	16

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- The objective of the Main Project is to culminate the academic study and provide an opportunity to explore a problem or issue , address through focused and applied research under the direction of a faculty mentor. The project demonstrates the student's ability to synthesize and apply the knowledge and skills acquired to real-world issues and problems. This project affirms the students to think critically and creatively, find an optimal solution, make ethical decisions and to present effectively.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Apply the knowledge and skills acquired in the course of study addressing a specific problem or issue.
CO2	To encourage students to think critically and creatively about societal issues and develop user friendly and reachable solutions
CO3	To refine research skills and demonstrate their proficiency in communication skills.
CO4	To take on the challenges of teamwork, prepare a presentation and demonstrate the innate talents.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**1**	**2**	**3**	**1**	**1**	**2**	**2**	**2**	**2**
CO2	**2**	**2**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**2**
CO3	**1**	**2**	**3**	**2**	**2**	**2**	**1**	**1**	**3**	**1**
CO4	**3**	**1**	**2**	**3**	**1**	**1**	**2**	**2**	**2**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**2**	**1**	**1**
CO2	**1**	**2**	**1**
CO3	**2**	**1**	**1**
CO4	**2**	**1**	**1**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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Semester 4

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IL04	Project phase-II	Lb	0	0	32	16

- Review detailed Analysis / Modeling / Simulations / Design / Problem solving / Experiments as needed.
- Finalize executable project modules after considering risks and efficient tools for designing project modules.
- Combine all the modules through effective team work after efficient testing.
- Develop a final product / process, perform efficient Testing, arrive optimized results and conclusions and suggest future directions.
- Prepare a paper for Conference Presentation and Journal Publication and get review comments.
- Elaborate the completed task, compile the work in PPT slides and create a Project Report in the standard format.

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE01	Vulnerability Assessment and Penetration Testing	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Understand the Penetration Testing.
- Analyze various attacks
- Analyze data collection and reporting tools
- Describe the coding for penetration
- Analyze the test using various tools

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Describe the testing tools and extracting information
CO2	Will have the knowledge to defend the attacks through password
CO3	Evaluate the data and testing through tools
CO4	To test the coding for penetration
CO5	Examine the testing data with tools

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**1**
CO2	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**
CO4	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**
CO2	**3**	**3**	**3**
CO3	**3**	**2**	**2**
CO4	**3**	**3**	**3**
CO5	**3**	**3**	**3**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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Elective 1

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE01	Vulnerability Assessment and Penetration Testing	Ty	3	0	0	3

UNIT I PENETRATION TESTING 9 Hrs

Introduction to Kali and Backtrack-Linux tools – Attack Machine- Phases of penetration test-reconnaissance extracting information from DNS-scanning-pings and ping sweeps-port scanning- NMap-Vulnerability scanning

UNIT II EXPLOITATION 9 Hrs

Gaining access to remote services-metasploit-password crackers- local and remote password cracking- password resetting-Wire shark-social engineering-website attack vectors-web based exploitation-interrogating web servers – Spidering- code injection attacks- cross-site scripting- post exploitation- maintaining access with backdoors, root kits and meterpreter

UNIT III DATA COLLECTION REPORTING TOOLS 9 Hrs

Data gathering, Network analysis and pillaging – Bypassing firewalls and avoiding detection - Preparation – Stealth scanning through the firewall – Avoiding IDS – Cleaning up compromised hosts – Miscellaneous evasion technique - Data Collection tools and reporting – Record now sort later – The text editor method – Dradis framework for collaboration – Setting up virtual test lab – Putting it all together.

UNIT IV CODING FOR PENETRATION TESTERS 9 Hrs

Command shell scripting –Python basics – File Manipulation – network communications – Introduction to Perl – Perl Basics- working with Perl- Introduction to Ruby- building classes with ruby- Introduction to Web scripting with PHP – Manipulating windows with Power shell – Scanner Scripting – Exploitation Scripting – Post Exploitation Scripting.

UNIT V TOOLS AND CASE STUDIES 9 Hrs

Penetration Testing Tools: information gathering, web application testing, infrastructure testing Vulnerability Assessment Tools: network security scanners and web security scanners- case studies

REFERENCES: Total Hours: 45

1. *The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Engebretson Elsevier Publication, 2nd Edition.*
2. ***Penetration Testing: Hacking and Penetration Testing, an Ultimate Security Guide (Python, Ethical Hacking, Basic Security) (Learning Hacking, Penetration Testing and Programming) by D. James Smith**, 2015.*
3. *Penetration Tester's Open Source Toolkit, Third Edition by Jeremy Faircloth, 2011.*
4. *Coding for Penetration Testers: Building Better Tools by Jason Andress and Ryan Linn, 2011*

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IEL1	Vulnerability Assessment and Penetration Testing lab	Ty	0	0	4	2

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To Learn the n/w mapping& Identification
- To understand the different Sweeping technique
- To understand the packet crafting & fingerprinting using remote OS
- To Understand various problems in File systems
- To Understand the web testing techniques .
-

COURSE OUTCOMES (Cos)
Students completing this course were able to

CO1	Guide to map the N/W
CO2	Will have the knowledge to sweeping techniques
CO3	Explain packet crafting & interpreting through tools
CO4	Analyze and explain file system
CO5	Use the web testing techniques

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**1**
CO2	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**
CO4	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**
CO2	**3**	**3**	**1**
CO3	**2**	**2**	**2**
CO4	**2**	**3**	**2**
CO5	**3**	**3**	**1**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
							√		

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Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IEL1	Vulnerability Assessment and Penetration Testing lab	Ty	0	0	4	2

OBJECTIVES:

To implement the following list of programs

1. Network Mapping & Target Identification

a. Analysis of output from tools used to map the route between the engagement point and a number of targets.

b. Network sweeping techniques to prioritize a target list and the potential for false negatives.

2. Interpreting Tool Output - Interpreting output from port scanners, network sniffers and other network enumeration tools.

3. Filtering Avoidance Techniques - The importance of egress and ingress filtering, including the Risks associated with outbound connections.

4. Packet Crafting - Packet crafting to meet a particular requirement:

- modifying source ports
- Spoofing IP addresses
- Manipulating TTL's
- Fragmentation
- Generating ICMP packets

5. OS Fingerprinting - Remote operating system fingerprinting; active and passive techniques.

6. Network Access Control Analysis - Reviewing firewall rule bases and network access control lists.

7. File System Permissions

a. File permission attributes within UNIX and Windows file systems and their security implications.

b. Analyzing registry ACLs

8. Configuration Analysis - Analyzing configuration files from the following types of Cisco equipment:

- Routers
- Switches

9. Unix Security Assessment

a. User enumeration- Discovery of valid usernames from network services commonly running by default:

- rusers
- rwho
- SMTP
- finger

b. Unix vulnerabilities - Common post-exploitation activities:

- exfiltrate password hashes
- crack password hashes
- check patch levels
- derive list of missing security patches
- reversion to previous state

c. FTP - FTP access control

Anonymous access to FTP servers

Risks of allowing write access to anonymous users

d. Send mail / SMTP - Valid username discovery via EXPN and VRFY

Awareness of recent Send mail vulnerabilities; ability to exploit them if possible.

Mail relaying

10. Web Testing Techniques

a. Web Site Structure Discovery-

- Spidering tools and their relevance in a web application test for discovering linked content.
- Forced browsing techniques to discover default or unlinked content

b. Cross Site Scripting Attacks

- Arbitrary JavaScript execution.
- Using Cross Site Scripting techniques to obtain sensitive information from other users.
- Phishing techniques.

c. SQL Injection

- Determine the existence of an SQL injection condition in a web application.
- Determine the existence of a blind SQL injection condition in a web application.
- Exploit SQL injection to enumerate the database and its structure.
- Exploit SQL injection to execute commands on the target server.

d. Session ID Attacks

- Investigate session handling within a web application.
- Harvest and analyze a number of session identifiers for weaknesses.

e. Data Confidentiality & Integrity

- Identifying weak (or missing) encryption.
- Identifying insecure SSL configurations.

f. Directory Traversal

- Identifying directory traversal vulnerabilities within applications.

g. Code Injection

- Investigate and exploitation of code injection vulnerabilities within web applications

h. Application Logic Flaws

- Assessing the logic flow within an application and the potential for subverting the logic

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Please Turn Over

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE02	Applied Cryptography	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Acquire fundamental knowledge on the concepts of finite fields and number theory
- Identify the various cryptographic protocols
- Identify the intermediate protocols
- Describe the principles of public key cryptosystems, hash functions and digital signature.
- Understand various block cipher and stream cipher models

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the fundamentals of number theory and algorithms
CO2	To design, analyze and implement different cryptography protocols
CO3	Apply the intermediate protocols for linking and distributing
CO4	Understand various Security practices and System security standards
CO5	Apply the various Authentication schemes to simulate different applications

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO2	**3**	**3**	**3**	**2**	**2**	**1**	**2**	**1**	**2**	**1**
CO3	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**
CO4	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**
CO5	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**2**
CO3	**3**	**2**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE02	Applied Cryptography	Ty	3	0	0	3

UNIT I MATHEMATICAL FOUNDATION 9 Hrs

Number theory: Fermat's and Euler's theorem-Chinese remainder theorem-Euclidean algorithm- Test for primality-Discrete logarithms, Information theory: entropy, Uncertainity-Complexity theory: pseudo random number generation and generators.

UNIT II CRYPTOGRAPHIC PROTOCOLS 9 Hrs

Protocol Building Blocks-Basic Protocols: key Exchange-Authentication-Authentication and Key exchange: Wide-mouth frog, Yahalom, Kerberos-Formal Analysis of Authentication and Key Exchange Protocols-Multiple Key Public Key Cryptography-Secret Splitting-Secret Sharing: Secret Sharing with Cheaters-Cryptographic protection of Databases.

UNIT III INTERMEDIATE PROTOCOLS: 9 Hrs

Time stamping services, Linking protocol, Distributed Protocol-Proxy Signatures-Group Signatures-Advanced Protocols: Zero knowledge proof, Parallel Zero Knowledge Proof, Zero Knowledge proof of identity: Chess Grandmaster Problem-Blind Signatures-Simultaneous Contract Signing-Digital certified Mail-Simultaneous Exchange of Secrets-Esoteric protocols: Secure Elections-Secure Multiparty Computation.

UNIT IV CRYPTOGRAPHIC TECHNIQUES 9 Hrs

Key Length: Symmetric key Length, Public Key Key length-Algorithm types and Modes: Electronic Code Book Mode, Block Replay, Cipher Block Chaining Mode-Using Algorithms: Choosing an Algorithm, Public Key Cryptography vs Symmetric Cryptography, Encrypting Communication Channels.

UNIT V CRYPTOGRAPHIC ALGORITHMS 9 Hrs

Block Ciphers: Lucifer, New Des, RC2-Combining Block Ciphers: Double Encryption, Triple Encryption, Cascading Multiple Algorithms-One Way Hash Functions: Snefru, N-Hash, MD5, SHA-Public Key Algorithms: RSA, Pohlig-Hellman, Rabin, Elliptic Curve Cryptosystems -Public Key Digital Signature Algorithms: Ghost Digital Signature Algorithm, Discrete Logarithm Signature schemes.

Total Hours: 45

REFERENCES:

1. Applied Cryptography: Protocols, Algorithms and source code in C, Wiley, Second Edition-Bruce Schneier (OCT 18, 1996)
2. Cryptography and Network Security Principles and practices-William Stallings (Jan 24, 2010)
3. Foundations of Cryptography: Volume 1, Basic Tools by OdedGoldreich (Jan 18, 2007)
4. Encryption: High-impact Strategies - What You Need to Know: Definitions, Adoptions, Impact, Benefits, Maturity... by Kevin Roebuck, Emereopty Limited, 2011.
5. Foundations of Cryptography: Volume 2, Basic Applications by OdedGoldreich (Sep 17, 2009)

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IEL2	Applied Cryptography Lab	Lb	0	0	4	2

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Demonstrate various security applications, IPSec, Firewall, IDS, Web Security, Email Security and Malicious software etc.,

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Identify the security issues in the network and resolve it.
CO2	Analyse the vulnerabilities in any computing system and hence be able to design a security solution.
CO3	Evaluate security mechanisms using rigorous approaches by key ciphers and Hash functions.
CO4	Utilize the various Security like web, email firewall
CO5	Apply the various Analysis of DES

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO2	**3**	**3**	**2**	**2**	**2**	**1**	**2**	**1**	**2**	**1**
CO3	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**1**
CO4	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**1**
CO5	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**2**
CO3	**3**	**2**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
							√		

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEL2	Applied Cryptography Lab	Lb	0	0	4	2

OBJECTIVES:

To implement the following list of programs

1. Implementation of S-DES algorithm for data encryption
2. Implementation of Triple - DES algorithm for data encryption
3. Implement RSA asymmetric (public key and private key)-Encryption.
4. Histogram analysis of Caesar Cipher and DES
5. Generate Digital Signature using Hash code & MAC code
6. Create a Hash Code using MD5
7. Generate a Hash Code using SHA-1
8. Diffie-Hellman Key Exchange Protocol
9. Breaking of Mono-alphabetic and Poly-alphabetic ciphers
10. Breaking of Columnar transposition Ciphers
11. Implementation of Linear Cryptanalysis of DES
12. Implementation of Interpolation attack and related key attack.

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE03	Secured Programming	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Understand the security alerts
- Analyze the security errors
- To study the security testing and use.
- Describe the new security models and tools
- Understand the security issues in application.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	How to respond to security alerts which identifies software issues
CO2	Identify possible security programming errors
CO3	Define methodology for security testing and use appropriate tools in its implementation
CO4	Apply new security-enhanced programming models and tools
CO5	Analyze the security issues in applications using programming techniques

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**2**	**3**	**1**	**3**	**2**	**2**	**2**	**-**	**-**
CO2	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**-**	**-**
CO3	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**
CO4	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**
CO5	**3**	**1**	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**1**	**-**
CO2	**3**	**1**	**-**
CO3	**3**	**2**	**-**
CO4	**3**	**2**	**-**
CO5	**3**	**2**	**-**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE03	Secured Programming	Ty	3	0	0	3

UNIT I **9 Hrs**

Validating all input & Designing secure programs: Command line and environment variables, File descriptors, names and contents, Web based application inputs, Locale selection and character encoding, Filtering representable URIs, preventing cross site malicious input content, Forbidding HTTP Input to perform non-queries. Good security design principles: Securing the interface, separation of data and control. Minimize privileges: Granted, time, modules, resources etc, Using chroot, careful use of setuid/setgid.

UNIT II **9 Hrs**

Safe default value and load initializations, Avoid race conditions, Trustworthy channels and trusted path, Avoiding semantics and algorithmic complexity attacks. Declarations and Initializations and Expressions: Declare objects with appropriate storage durations, Identifier declaration with conflict linkage classifications, Using correct syntax for declaring flexible array member, Avoiding information leakage in structure padding, Incompatible declarations of same function or object.

UNIT III **9Hrs**

Dependence on evaluation order for side effects: Reading uninitialized memory and dereferencing null pointers, Modifying objects with temporary lifetime, Accessing variable through (pointer) incompatible type, Modifying constant objects and comparing padding data. Integers and Floating Points: Wrapping of unsigned integers, Integer conversions and misrepresented data, Integer overflow and divide by zero errors, Shifting of negative numbers, Using correct integer precisions, Pointer conversion to integer and vice versa.

UNIT IV **9Hrs**

Floating point values for counters: Domain and range errors in math functions, Floating point conversions and preserving precision. Arrays , Strings and Memory Management: Out of bounds subscripts and valid length arrays, Comparing array pointers, Pointer arithmetic for non-array object, scaled integer, Modifying string literals, Space allocation for strings (Null terminator), Casting large integers as unsigned chars, Narrow and wide character strings and functions.

UNIT V **9 Hrs**

Accessing freed memory: Freeing dynamically allocated memory, Computing memory allocation for an object, Copying structures containing flexible array members, Modifying object alignment by using realloc. I/O, Signals and Error Handing: User input and format strings, Opening anpreopened file, Performing device operations appropriate for files.

TOTAL HOURS:45

Text Book:

1. Robert C. Seacord The CERT ® C Coding Standard: 98 Rules for Developing Safe,Reliable, and Secure Systems, Second Edition, Addison Wesley Professional, April 2014.(Chapters 2to 9, 11 and 12)
2. David Wheeler Secure Programming for Linux and UnixHowTo, Linux Documentation Project, Aug 2004. (Chapters 5 and 7)

Reference book:

1. JohnViega and Matt Messier Secure Programming Cookbook for C and C++, O'Reilly Media, First Edition, July 2003.

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IEL3	Secured Programming Lab	Lb	0	0	4	2

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Understand the files and data types using programs
- To Study the unsafe programming
- To Learn the various problems using file concepts.
- Understand the Shell script techniques .

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Use the file concepts in programming
CO2	Demonstrate dangers of unsafe programming
CO3	Demonstrate the dependence on evaluation order
CO4	Demonstrate the file concepts using programs
CO5	Demonstrate the shell script to create file

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**2**	**3**	**1**	**3**	**2**	**2**	**2**	-	-
CO2	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	-	-
CO3	**1**	**1**	**1**	**3**	**2**	**2**	**2**	**2**	-	-
CO4	**1**	**2**	**1**	**3**	**2**	**2**	**2**	**2**	-	-
CO5	**3**	**1**	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**2**	**1**	-
CO2	**2**	**1**	-
CO3	**3**	**2**	-
CO4	**2**	**2**	-
CO5	**1**	**2**	-

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEL3	Secured Programming Lab	Lb	0	0	4	2

Laboratory Experiments:

1. Write a program to validate filenames. The filenames should allow alphanumeric and underscore. Eliminate the special characters in the filename.

2. Write a program to ensure the floating point conversion is within the range of the new (Integer) type.

3. Demonstrate dangers of unsafe programming e.g. use of strlen, strcpy, strcat, sprintf, gets, and scanf family of functions etc.

4. Demonstrate buffer overflow using different sizes of integers especially between 64bits and 32 bits integers.

5. Demonstrate the dependence on evaluation order for side effects.

6. Demonstrate use of chroot to limit the files visible to programs.

7. Write a program to create secure temporary files using mkstemp().

8. Write a program to demonstrate dangers of referencing freed memory.

9. Write a shell script to mask the permissions of newly created file using umask().

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE04	Basics of Forensics Psychology	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To learn the basic psychology and types
- Analyze the behavior of biology and its structure
- Evaluate the learning process
- Identify the concepts of reasoning and thinking of images
- Discuss measuring and motivation of intelligence

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understanding the psychology of historical roots
CO2	To know about the structure of biology and its behaviours
CO3	Evaluate the learning process through various learning methods.
CO4	To solve the problem of mental image thinking.
CO5	Understanding the emotional experience

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**
CO2	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**2**	**2**
CO3	**2**	**3**	**2**	**2**	**3**	**2**	**1**	**1**	**3**	**3**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**3**
CO5	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**1**
CO2	**3**	**3**	**1**
CO3	**3**	**2**	**1**
CO4	**3**	**2**	**1**
CO5	**3**	**1**	**1**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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CYBER FORENSICS AND INFORMATION SECURITY

Elective 2

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE04	Basics of Forensics Psychology	Ty	3	0	0	3

UNIT I **9 Hrs**

Historical roots, Modern major perspectives of psychology, distinguishing professional and pseudo-psychology, types of psychological professionals. The science and research methods, professional ethics of research, research challenges.

UNIT II **9 Hrs**

The biology underlying behavior: Nerves and neurons, structure and functions of neurons, neurotransmitters, Central Nervous System, peripheral nervous system. The human brain: its structure and function, sensory system and endocrine system, Stages of sleep, REM sleep, sleep disturbances, States of consciousness, altered states of consciousness, attention and awareness, sensation of perception, problems in attention and perception.

UNIT III **9 Hrs**

Learning process: Latent learning, observational learning. Memory: Recalling long term memories, Retrieval clues, constructive purposes in memory, memory in courtroom, autobiographical memory. Stages in memory: Encoding, storage and retrieval of memory. Forgetting: Proactive and retroactive interference. Memory dysfunctions: Afflictions of forgetting.

UNIT IV **9 Hrs**

Cognition: Thinking and reasoning, thinking mental images, concepts, reasoning. Problem solving: Production, judgment, impediments to problems solving. Language and Intelligence Language: Grammar, language development, influence of language on thinking.

UNIT V **9 Hrs**

Intelligence: Measuring intelligence (IQ), practical intelligence-measuring commonsense. Motivation and Emotion: Types of approaches of motivation. Emotion: Understanding emotional experiences, functions of emotions and determining range of emotions, Coping with stress.

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TOTAL HOURS: 45

TEXTBOOK:

Understanding Psychology by Robert S. Feldman, 10th edition, McGraw Hill, 2011.

REFERENCES:

1. Introduction to Psychology by Dennis Coon, 11th Edition, India Edition, Cengage Learning, 2011
2. Psychology by Saundra K Ciccarelli and Glenn E Meyer, South Asia Edition, Pearson Publication, 19th Impression 2016
3. Introduction to forensic psychology: Research and Application, 5th edition by Curt R Bartol, Anne M Bartol, SAGE Publications, 2018

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE05	Operating System Security	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- Understanding the concepts of Operating System and process.
- To learn synchronization and its process
- Discuss the distributed file systems and its memory sharing
- Analyze protection and security models
- To study the requirements of database and control

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Will have the knowledge of operating systems & process
CO2	Apply knowledge in real time system through synchronization
CO3	To share the memory and file systems.
CO4	Will understand how to authenticate in distributed systems.
CO5	Apply optimization and calculate the theoretical approach.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**2**
CO2	**3**	**3**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**-**
CO3	**3**	**3**	**2**	**1**	**2**	**1**	**2**	**1**	**1**	**1**
CO4	**3**	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**2**	**1**
CO5	**3**	**3**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**3**	**1**
CO2	**3**	**3**	**1**
CO3	**3**	**3**	**1**
CO4	**3**	**3**	**2**
CO5	**3**	**3**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE05	Operating System Security	Ty	3	0	0	3

UNIT I : OVERVIEW OF OPERATING SYSTEMS **9 Hrs**

Operating System concepts, Process Management and Scheduling, Memory Management: Partitioning, Paging, Segmentation, Virtual memory, Device and File management, Introduction to Operating System Security, Operating System Security Mechanism, Case studies : Linux and Windows.

UNIT II : SYNCHRONIZATION AND PROCESSES **9 Hrs**

Clock Synchronization, Mutual Exclusion, Election Algorithms, Atomic Transactions, Deadlocks, Processes,

Threads, System Models, Processor Allocation, Scheduling, Fault Tolerance, Real Time Distributed Systems.

UNIT III : SHARED MEMORY AND FILE SYSTEMS **9 Hrs**

Shared Memory, Consistency Models, Page based distributed shared memory, Shared variables, Object based distributed shared memory, Distributed File Systems: Design and Implementation.

UNIT IV: PROTECTION AND SECURITY **9 Hrs**

Protection and Security - Preliminaries, Operating System Security Models, Vulnerability Analysis and Common Unit Vulnerabilities, Data security, Cryptography: Model of cryptography, Conventional cryptography, Modern cryptography, Private Key Cryptography, Data Encryption Standard, Public Key Cryptography, Multiple Encryption, Authentication in distributed systems.

UNIT V : CONCURRENCY CONTROL AND OPTIMIZATION **9 Hrs**

Database Operating systems : Introduction, Requirements of a database Operating System, Concurrency control : Theoretical Aspects, Introduction, Database Systems, A Concurrency Control Model of database systems, The Problem of Concurrency Control, Serializability theory, Distributed database systems.

TOTAL HOURS: 45

Text Books :

1. Andrew S Tanenbaum , " Distributed Operating Systems " , Pearson Education India, 2001.

Reference Books :

1. MukeshSinghal, Niranjan G Shivratri , "Advanced Concepts in Operating Systems", McGraw Hill International, 1994.
2. Pradeep Kumar Sinha, "Distributed Operating Systems: Concepts and Design", PHI, 2002.

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE06	ADVANCED COMPUTER NETWORKS AND SECURITY	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To Learn the inter networking and security issues
- Acquire the knowledge of VoIP security and controls.
- Understand the different types of Security mechanisms.
- Understand the communications in various advanced technologies.
- To study the overview of networks and communication

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Gain knowledge of network security
CO2	Verify the knowledge of VoIP Security
CO3	Apply the mechanisms for security purpose..
CO4	Evaluate the concepts in network security
CO5	Apply the technology for network communication

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO2	**3**	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**2**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**1**	**2**	**1**	**2**	**1**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**
CO5	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE06	Advanced Computer Networks and Security	Ty	3	0	0	3

UNIT I INTERNETWORKING AND DATA SECURITY 9 Hrs

Network ownership, service paradigm and performance-protocols and layering-internetworking concepts, architecture and protocols-IP internet protocol, addresses-binding protocol addresses (ARP), IP data grams and data grams forwarding- IP Encapsulation, fragmentation and reassembly, UDP-TCP reliable transport service, Security design issues in UDP –TCP-IP protocols.

UNIT II VoIP SECURITY 9 Hrs

Introduction, VoIP architecture and Protocols, Threats and Attacks, VoIP Vulnerabilities, Signaling protection mechanism, Media protection mechanism, Key Management Mechanism, VoIP and Network security controls.

UNIT III TELECOMMUNICATION SECURITY 9 Hrs

Introduction-Cellular Architecture-Basics of Security—Security problems in Telecommunication And cell network-Vulnerability in telephone, SMS, Data Network**.**

UNIT IV WIRELESS NETWORKS AND SECURITY 9 Hrs

Evolution of Wireless Networks, Mobile Communications technologies- wireless channel-Network design-Ad hoc Networks-Bluetooth technology-Security aspects of Wireless Networks.

UNIT V ADVANCED COMMUNICATION TECHNOLOGY 9 Hrs

Overview - Optical Networks - Advanced intelligent Networks-Home networking – 5G, IoE, Big data, Green Communication, VANET.

Total Hours: 45

REFERENCES:

1. *Walrand.J. Varaiya, High Performance Communication Network, Morgan Kauffman Harcourt Asia Pvt Ltd, 2nd Edition, 2000.*
2. *William Stallings ISDN & Broadband ISDN with frame Relay & ATM, PHI 4th Edtion 2000.*
3. *Uyless Black Emerging Communications Technologies2/e Prentice Hall 1997.*
4. *Bates & Donald W.Gregory Voice & Data Communications Handbook, Mc-Graw Hill, Edition,*
   3rd edition 2000.
5. *Securing VoIP Networks: Threats, Vulnerabilities, and Countermeasures by Peter Thermos and Ari Takanen (Aug 11, 2007).*
6. *Patrick Traynor, Patrick McDaniel, Thomas La Porta, Security for Telecommunication Network-Springer,2008.*

M.TECH .
CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE07	Information Security	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- The students will be able to gain the knowledge about Information and to discover knowledge in collecting data about organization
- To do various analysis on information risk assessment.
- Identify the security risks
- To understand IT audit and its activities.
- Discuss about IT infrastructure audit

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Apply the knowledge in information security.
CO2	Audit the risk assessment
CO3	Review the security risks
CO4	Examine the audit about the compliance.
CO5	Evaluate the IT infrastructure audit report

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO2	**2**	**1**	**3**	**2**	**3**	**1**	**2**	**1**	**2**	**1**
CO3	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**2**	**1**
CO4	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**
CO5	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
					√				

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Elective 3

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE07	Information Security	Ty	3	0	0	3

UNIT I INTRODUCTION **9 Hrs**

Introduction to Risk management, Applying Risk management to Information Security, Risk management Lifecycle.

UNIT II RISK ASSESSMENT AND ANALYSIS TECHNIQUES **9 Hrs**

Risk Profiling, Formulating a Risk, Risk exposure factors, Security controls and services, Risk Evaluation and Mitigation strategies, Risk Assessment Techniques.

UNIT III BUILDING AND RUNNING A RISK MANAGEMENT PROGRAM 9 Hrs

Threat and Vulnerability Management, Security Risk reviews, A Blueprint for security, Building a program from scratch.

UNIT IV INFORMATION SECURITY COMPLIANCE **9 Hrs**

Need for Information Security Compliance, Scope of IT Infrastructure, and Auditing for Compliance - Auditing Standards and Frameworks.

UNIT V IT Infrastructure Audit **9 Hrs**

Planning an IT Infrastructure audit for compliance, conducting an IT Infrastructure audit for compliance, writing the IT Infrastructure Audit Report.

Total Hours: 45

REFERENCES:

1. *Security Risk Management: Building an Information Security Risk Management Program from the Ground Up, Evan Wheeler, 2011 Elsevier Inc.*
2. *Auditing IT Infrastructures for Compliance (Information Systems Security & assurance) by Martin Weiss and Michael G. Solomon, Jones & Bartlett Publishers, September 2010.*
3. *Management of Information Security, Michael E. Whitman (Author), Herbert J. MattordCourse Technology; 3 edition (January 19, 2010)*
4. *Security De-Engineering: Solving the Problems in Information Risk Management, Ian Tibble Auerbach Publications; 1 edition (December 13, 2011)*
5. *Information Security Risk Analysis, Third Edition, Thomas R. Peltier (Author), Auerbach Publications; 3 edition (March 16, 2010)*

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE08	Cyber Law and IPR	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To understand the origin and development of cyber laws
- To understand the various rules and procedures for the applicability of the cyber space
- To understand the copyright on cyberspace
- To understand the crime investigation rules
- To understand the origin and development of IPRs

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the importance of E-commerce
CO2	Understand the cyber space and protection of copyrights
CO3	Analyze the copyright issues in cyber space
CO4	Understand the legalities through analysis of crime investigation
CO5	Learn the general principles in introduction of IPRs

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO2	**2**	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**2**	**1**
CO3	**2**	**3**	**3**	**2**	**2**	**1**	**2**	**1**	**2**	**1**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**
CO5	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
					√				

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE08	Cyber Law and IPR	Ty	3	0	0	3

UNIT I INTRODUCTION 9 Hrs

Reorganization of Electronic Records - UNICITRAL Model Law, Legal Aspects of Electronic Records / Digital Signatures - UNICITRAL Model Law, UNICITRAL Model Law : relating to the retention of Data Messages, Attributes of Data Messages, Acknowledgement of Data Messages, Time and Place receipt of Data Messages – Securing Electronic Record and electronic / Digital Signature in India – Verification of electronic Signature in India.

UNIT II CYBER SPACE 9 Hrs

The Cyberspace – Protection of Copyrights of Cyber Space – Rights of Software Owners – Infringement of Copyright – remedies for infringement of Copyright on Cyberspace – The liabilities of an Internet Service Provider (ISP) in Cyberspace – Cyberspace and the Protection of Patents in India.

UNIT III CYBER TRIBUNAL 9 Hrs

Cyber Appellate tribunal - Its Function and Powers under IT Act – Obscenity and pornography on Cyberspace – Hacking on Cyberspace on Internet – Other Offences – violation of the Right of Privacy on Cyberspace / Internet – Punishment for violation of Privacy, Breach of Confidentiality and Privacy under the IT Act – Terrorism on Cyberspace / Internet.

UNIT IV CYBER CRIMES INVESTIGATION 9 Hrs

An Overview of Cyber Crimes – Indian Evidence Act – Examiner of Electronics Act – Amendments Introduced in Indian Evidence Act, 1872 – Relevant Provisions under IT Act as Amended upto 2008 – IT (Certifying Authorities) Rules, 2000 – Ministerial Order on Blocking of Websites – The IT (Use of Electronics Records and Digital Signatures) Rules 2004.

UNIT V IPR 9 Hrs

Concept of IPR - Patents- Indian Patent Act - Patent databases-patent information system-preparation of patent documents-trademarks- copyrights-industrial designs-geographical indication- protection of trade secrets-management and valuation of intellectual property

Total Hours: 45

REFERENCES:

1. *Cyber Law & IT Protection, Eastern Economy Edition, by Harish Chander.*
2. *Cyber Law: the law of Internet – Jonathan Rose nor, Springer, 1997.*
3. *The Law and Economics of Cyber Security – Mark F Grady, Francesco Parisi, August 2011.*
4. *Cyber law: National and International Perspectives by Roy J. Girasa and 2001*
5. *Intellectual Property Rights – Law and Practice Institute of Company Secretaries of India2014*

Law Relating to Patents, Trademarks, Copyright, Designs and Geographical Indications by B L Wadehra ISBN-13: 978-8175341852 Universal Book Traders; 2nd edition

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Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE09	Biometrics	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To provide students with understanding of biometrics, biometric equipment and standards applied to security.
- To expose the context of Biometric Applications
- To learn the various authentication with passwords
- To learn to various biometrics systems

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Demonstrate knowledge of the basic physical and biological science and engineering principles underlying biometric systems
CO2	Understand and analyze biometric systems at the component level and be able to analyze and design basic biometric system applications.
CO3	Be able to work effectively in teams and express their work and ideas orally and in writing.
CO4	Identify the sociological and acceptance issues associated with the design and implementation of biometric systems.
CO5	Understand various Biometric security issues.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**3**	**1**	**1**
CO2	**3**	**3**	**3**	**2**	**3**	**1**	**1**	**3**	**1**	**1**
CO3	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**
CO4	**3**	**3**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**1**
CO5	**3**	**3**	**3**	**1**	**3**	**3**	**1**	**3**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
					√				

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE09	Biometrics	Ty	3	0	0	3

Unit – I: Biometrics **9 Hrs**

Biometrics- Introduction- benefits of biometrics over traditional authentication systems - benefits of biometrics in identification systems-selecting a biometric for a system – Applications - Key biometric terms and processes - biometric matching methods -Accuracy in biometric systems.

Unit – II: Physiological Biometric Technologies **9 Hrs**

Physiological Biometric Technologies: Fingerprints - Technical description –characteristics - Competing technologies - strengths – weaknesses – deployment - Facial scan and Iris Scan - characteristics - weaknesses-strengths - deployment - Retina vascular pattern - characteristics - strengths – weaknesses –deployment - Hand scan - characteristics - strengths – weaknesses deployment – DNA biometrics.

Unit – III: Behavioral Biometric Technologies **9 Hrs**

Behavioral Biometric Technologies: Handprint Biometrics - DNA Biometrics - signature and handwriting technology - Technical description – classification - keyboard / keystroke dynamics - Voice – data acquisition - feature extraction - characteristics - strengths – weaknesses- deployment.

Unit – IV: Multi Biometrics **9 Hrs**

Multi biometrics: Multi biometrics and multi factor biometrics - two-factor authentication with passwords - tickets and tokens – executive decision - implementation Plan.

Unit – V: Case Studies **9 Hrs**

Case studies on Physiological, Behavioral and multifactor biometrics in identification systems.

REFERENCES: **TOTAL HOURS : 45**

1. *Samir Nanavathi, Michel Thieme, and Raj Nanavathi, "Biometrics -Identity verification in a network", Wiley Eastern*
2. *John Chirillo and Scott Blaul," Implementing Biometric Security", Wiley Eastern Publications*
3. *John Berger," Biometrics for Network Security", Prentice Hall*

M.TECH .
CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IE10	Information Security Audit	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To introduce the fundamental concepts and techniques in computer and network security, giving students an overview of information security and auditing.
- To expose students to the latest trend of computer attack and defense. Other advanced topics on information security such as mobile computing security, security and privacy of cloud computing, as well as secure information system development will also be discussed.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Discussed various algorithms and Distributions.
CO2	Understanding the approaches of message authentication
CO3	Learning security principles and its requirements
CO4	Know the roles and procedures for audit
CO5	Analyze the approaches to audits during the system development

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**3**	**1**	**1**
CO2	**3**	**3**	**3**	**2**	**3**	**1**	**1**	**3**	**1**	**1**
CO3	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**
CO4	**3**	**3**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**1**
CO5	**3**	**3**	**3**	**1**	**3**	**3**	**1**	**3**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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Elective IV

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IE10	Information Security Audit	Ty	3	0	0	3

UNIT – I : **9 Hrs**

A model for Internetwork security, Conventional Encryption Principles & Algorithms (DES, AES, RC4, Blowfish), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution. Public key cryptography principles, public key cryptography algorithms (RSA, Diffie-Hellman, ECC), public Key Distribution.

UNIT – II : **9 Hrs**

Approaches of Message Authentication - Secure Hash Functions (SHA-512, MD5) and HMAC, Digital Signatures, Kerberos, X.509 Directory Authentication Service, Email Security: Pretty Good Privacy (PGP) IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT – III : **9 Hrs**

Web Security:Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Firewalls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems

UNIT – IV : **9 Hrs**

Auditing For Security:Introduction, Basic Terms Related to Audits, Security audits, The Need for Security Audits in Organization, Organizational Roles and Responsibilities for Security Audit, Auditors Responsibility In Security Audits, Types Of Security Audits.

UNIT – V : **9 Hrs**

Auditing For Security: Approaches to Audits, Technology Based Audits Vulnerability Scanning And Penetration Testing, Resistance to Security Audits, Phase in security audit, Security audit Engagement Costs and other aspects, Budgeting for security audits, Selecting external Security Consultants, Key Success factors for security audits.

TEXT BOOKS **TOTAL HOURS: 45**

1. Cryptography and Network Security by William Stallings, Fourth Edition, Pearson Education 2007.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, 2008.
3. Cryptography & Network Security by Behrouz A. Forouzan, TMH 2007.
4. Information Systems Security by Nina Godbole, WILEY 2008.

REFERENCE BOOKS:

1. Information Security by Mark Stamp, Wiley – INDIA, 2006.
2. Fundamentals of Computer Security, Springer.
3. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
4. Computer Security Basics by Rick Lehtinen, Deborah Russell & G. T. Gangemi Sr., SPD O'REILLY 2006.
5. Modern Cryptography by Wenbo Mao, Pearson Education 2007.
6. Principles of Information Security, Whitman, Thomson.

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name :	Ty/Lb/ETL	L	T	P	C
MCS20IEL10	Information Security Audit Lab	Lb	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To study the nature of network security fundamentals
- To Study the attacks and capturing techniques
- To Learn about virus, anti-intrusion techniques
- Understand the implementation of DES and RSA algorithm
- Analyze the IP based authentication

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	How to remove the virus
CO2	How to Eliminate the attacks through security system
CO3	Will develop the web based password capturing
CO4	Implementing the Algorithm for data encryption
CO5	Will make the program through IP based authentication

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**3**	**1**	**1**
CO2	**3**	**2**	**3**	**2**	**3**	**1**	**1**	**3**	**1**	**1**
CO3	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**
CO4	**3**	**2**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**1**
CO5	**3**	**3**	**3**	**1**	**3**	**3**	**1**	**3**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**2**	**1**	**1**
CO3	**2**	**1**	**1**
CO4	**2**	**2**	**1**
CO5	**2**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
							√		

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEL10	Information Security Audit Lab	Lb	3	0	0	3

1. Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.
2. Study of System threat attacks - Denial of Services.
3. Study of Sniffing and Spoofing attacks.
4. Study of Techniques uses for Web Based Password Capturing.
5. Study of Different attacks causes by Virus and Trojans.
6. Study of Anti-Intrusion Technique – Honey pot.
7. Study of Symmetric Encryption Scheme – RC4.
8. Implementation of S-DES algorithm for data encryption
9. Implementation of Asymmetric Encryption Scheme – RSA.
10. Study of IP based Authentication.

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE11	Cyber Crime Investigation	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To study about cyber crime categories
- Awareness about various hacking, cracking and attacks.
- To study about various investigation strategies
- To study about various Techniques in Digital Forensics
- To learn accountability of forensics

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understanding the categories of crimes
CO2	How to overcome from hacking and attacking the systems
CO3	Analyze various attacks and reduce the risks while using system
CO4	Aware of attacks and prevent the computer fraud detection
CO5	Evaluate and maintain the accountability of forensics

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**3**	**1**	**1**
CO2	**3**	**3**	**3**	**2**	**3**	**1**	**1**	**3**	**1**	**1**
CO3	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**
CO4	**3**	**3**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**1**
CO5	**3**	**3**	**3**	**1**	**3**	**3**	**1**	**3**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
					√				

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE11	Cyber Crime Investigation	Ty	3	0	0	3

UNIT I OVERVIEW 9 Hrs

Hacking: Foundation for Ethical Hacking - Introduction to Ethical Hacking – Ethical Hacking framework -Hacking Methodology – Ethical Hacking in Motion- Social Engineering – Physical Security, **Cyber Attacks**: Definition- Factors - Types – Synthetic and Semantic attacks - Virus, Trojans and worms.

UNIT II OS ATTACKS 9 Hrs

Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat. Hacking: Windows – Linux and Novell NetWare hacking. Windows hacking : Vulnerabilities - Information gathering – File System – Polices ; Linux Hacking : Vulnerabilities -Information gathering – File System – File permission ; Novel NetWare - NetWare Vulnerabilities – Authentication and NetWare Security Risk management. Keyloggers- types and its Countermeasures; Introduction to Mobiles operating System – Android Windows , iOS and Black Berry.

UNIT III NETWORK ATTACKS 9 Hrs

Network attacks : War Dialing- General telephone-system vulnerabilities – attacks - Network Infrastructure - Scanning, Poking, and Prodding - Wireless LANs – Scanning - Wireless Network Attacks ; TCP / IP – Checksums ; Spoofing- IP, DNS ; Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Intrusion detection system – NIDS, HIDS – Penetrating testing process – Web Services – Reducing transaction risks.

UNIT IV APPLICATION AND MOBILE ATTACKS 9 Hrs

Application attacks: Malware – types – testing – Countermeasures; Messaging Systems – Email – attacks; Web-Application - Vulnerabilities - Web hacking – Strategic Planning Process.- Architecture strategies for computer fraud prevention – Protection of Web sites – Phishing, Session Hijacking, Cross Site Scripting.(XSS) ,Cross Site Request Forgery (CSRF) Countermeasures ; A study on various attacks – Input validation attacks – SQL injection attacks, PHP Injections– Buffer overflow attacks - Privacy attacks. Email Analysis and Spam Mails, Proxy Servers, Spoofing, Banner Grabbing; Introduction to Mobile attacks

UNIT V CASE STUDIES ON ATTACKS 9 Hrs

Accounting Forensics – Computer Forensics; Reporting the results - Plugging Security – Managing security Challenges; Case study on the ethical hacking tools-wire shark, capsa, malware analysis and web data extraction with report.

Total Hours: 45

REFERENCES:

1. *Hacking for Dummies by by Kevin Beaver Published by Wiley Publishing, Inc.2004*
2. *Kenneth C.Brancik "Insider Computer Fraud" Auerbach Publications Taylor & Francis Group–2008.*
3. *Ankit Fadia " Ethical Hacking" second edition Macmillan India Ltd, 2006*
4. *Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts... by Ali Jahangiri (Oct 21, 2009)*
5. *Ethical hacking countermeasures - An Ultimate Guide For Ethical Hackers [Paperback]Mr. Lomeaskeshkumar (Author), September 1, 2014.*

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEL11	Cyber Crime Investigation Lab	Lb	0	0	4	2

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To study the nature of Trojan, backdoors and sniffer network
- To Study the DDOS attacks,
- To Learn about testing, malware, data packet sniffers and hacking
- Understand the implementation of web data extractor , unix/linux concepts for coding

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Remove the virus in the system when affected by Trojan
CO2	Finding of the password cracking using techniques
CO3	Easy to detect the malware attack
CO4	Easy to identify the web data extractor and watcher
CO5	Apply reverse engineering concepts for coding

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**3**	**1**	**1**
CO2	**3**	**3**	**3**	**2**	**3**	**1**	**1**	**3**	**1**	**1**
CO3	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**
CO4	**3**	**3**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**1**
CO5	**3**	**3**	**3**	**1**	**3**	**3**	**1**	**3**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
							√		

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEL11	Cyber Crime Investigation Lab	Lb	0	0	4	2

1. Working with Trojans, Backdoors and sniffer for monitoring network communication
2. Denial of Service and Session Hijacking using Tear Drop, DDOS attack.
3. Penetration Testing and justification of penetration testing through risk analysis, SQL Injection Attacks, XSS, CSRF.
4. Password guessing and Password Cracking.
5. Wireless Network attacks, Bluetooth attacks
6. Firewalls, Intrusion Detection and Honey pots
7. Malware – Key logger, Trojans, Key logger countermeasures
8. Understanding Data Packet Sniffers – Wireshark, CACE Pilot, TCP dump/Win Dump, Network View, The Dude Sniffer, Ace, Capsa Network Analyzer.
9. Windows Hacking – NT LAN Manager, Secure 1 password recovery
10. Implementing Web Data Extractor and Web site watcher. Hacking Web Application
11. Buffer Overflow Attacks.
12. Enumeration – SNMP, SMTP, Unix/Linux, LDAP,NTP.
13. Programming and Reverse Engineering - Basics of coding in Ruby

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE12	Data Privacy	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To introduce the fundamentals of statistics ,data privacy & polices.
- To Study the mathematical model and computing practices
- To learn the protection models and surveys
- To study the computation system
- Aware of policies and practices of technology

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Learning and applying the concepts of statistics and policies
CO2	Describe the mathematical models and computations.
CO3	Capable to protect the models through techniques
CO4	Able to protect the system through computation.
CO5	Implement the policies and practices in the system

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**1**	**1**	**1**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
					√				

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE12	Data Privacy	Ty	3	0	0	3

Unit I : **9 Hrs**

Introduction- Fundamental Concepts, Definitions, Statistics, Data Privacy Attacks, Data linking and profiling, access control models, role based access control, privacy policies, their specifications, languages and implementation, privacy policy languages, privacy in different domains- medical, financial, etc.

Unit II : **9 Hrs**

Data explosion- Statistics and Lack of barriers in Collection and Distribution of Person-specific information, Mathematical model for characterizing and comparing real-world data sharing practices and policies and for computing privacy and risk measurements, Demographics and Uniqueness.

Unit III : **9 Hrs**

Protection Models- Null-map, k-map, Wrong map **-Survey of techniques-** Protection models (null-map, k-map, wrong map), Disclosure control, Inferring entity identities, Strength and weaknesses of techniques, entry specific databases.

Unit IV : **9 Hrs**

Computation systems for protecting delimited data- MinGen, Datafly, Mu-Argus, k-Similar, Protecting textual documents**:** Scrub.

Unit V : **9 Hrs**

Technology, Policy, Privacy and Freedom- Medical privacy legislation, policies and best practices, Examination of privacy matters specific to the World Wide Web, Protections provided by the Freedom of Information Act or the requirement for search warrants.

Total Hours: 45

Text books and References:

1. B. Raghunathan, The Complete Book of Data Anonymization: From Planning to Implementation, Auerbach Pub, 2013.

2. L. Sweeney, Computational Disclosure Control: A Primer on Data Privacy Protection, MIT Computer Science, 2002.

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEL12	Data Privacy lab	Lb	0	0	4	2

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- The student will know the fundamentals concepts of data privacy\
- Analyze implementation of DES ,RSA algorithms
- Study about the digital signature standard
- Learn the installation of root kits and options
- Understand the wireless audit and detection system

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Learning and applying the concepts of data privacy
CO2	Implementing DES and other algorithms.
CO3	Capable to implement the signature scheme
CO4	Installing the root kits
CO5	Execute the wireless audit and decrypt WEP and WPA.

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**1**	**1**	**1**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**2**	**2**
CO2	**3**	**1**	**1**
CO3	**3**	**1**	**2**
CO4	**3**	**2**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
							√		

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MCS20IEL12	Data Privacy lab	Lb	0	0	4	2

1. Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipher b) Playfair Cipher c) Hill Cipher d) Vignere Cipher e) Rail fence – row & Column Transformation
2. Implement the following algorithms a) DES b) RSA Algorithm c) Diffie-Hellman d) MD5 e) SHA-1
3. Implement the SIGNATURE SCHEME - Digital Signature Standard
4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5. Setup a honey pot and monitor the honeypot on network (KF Sensor)
6. Installation of rootkits and study about the variety of options
7. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler) Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w).

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE13	Database Design Security	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To learn the Basics of DBMS concepts
- To Understand the DDL,DML and SQL Procedures
- To learn the concepts of transaction processing
- To ability to work with the Database software
- To understand the security issues and audits

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Able to learn the basic concepts of DBMS
CO2	Apply the DDL, DML and SQL procedures and concepts of DBMS
CO3	How to validate and avoid dead lock
CO4	The students will have knowledge how the backend database is been maintained.
CO5	Able to create and maintain the database software

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**1**	**2**	**1**	**1**	**3**	**1**	**1**	**3**	**3**
CO2	**3**	**2**	**1**	**2**	**1**	**3**	**2**	**2**	**2**	**3**
CO3	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**3**
CO4	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**2**	**2**	**1**	**2**	**2**	**2**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**2**	**3**	**2**
CO2	**2**	**3**	**3**
CO3	**3**	**3**	**3**
CO4	**2**	**3**	**3**
CO5	**1**	**3**	**3**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
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CYBER FORENSICS AND INFORMATION SECURITY

Elective V

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE13	Database Design Security	Ty	3	0	0	3

UNIT I INTRODUCTION TO DATABASES 9 Hrs

Database Environment Database Architectures, The Relational Model, Relational Algebra and Relational Calculus, SQL: Data Manipulation, SQL: Data Definition, Query-By-Example

UNIT II DATABASE ANALYSIS AND DESIGN 9 Hrs

Database System Development Lifecycle ,Entity-Relationship Modeling, Enhanced Entity-Relationship Modeling, Normalization, Conceptual Database Design ,Logical Database Design for the Relational Model, Physical Database Design for Relational Databases

UNIT III TRANSACTION PROCESSING 9 Hrs

Transaction concept, concurrent execution, isolation, testing for serializability, Concurrency control, lock based - time-stamp based - validation based protocols, multi-version schemes, deadlock handling.

UNIT IV DATABASE SECURITY 9 Hrs

Introduction to database security, security models, physical and logical security, security requirements, reliability and integrity, sensitive data, inference, multilevel databases and multilevel security, access control- mandatory and discretionary , security architecture, issues.

UNIT V SECURITY ISSUES 9 Hrs

Application access, security and authorization, authorization in SQL, encryption and authentication, secure replication mechanisms, Audit- logon/logoff, sources, usage and errors, changes, external audit system architecture, archive and secure auditing information

Total Hours: 45

REFERENCES:

1. *Abraham Silberschatz, Hanry F Korth, Sudarshan S, "Database Systems Concepts", McGraw Hill, 2007.*
2. *Thomas M Connolly, Carolyn E Begg, Database Systems A Practical Approach to Design Implementation and Management, (3rd ed.), Addison Wesley.*
3. *Ron Ben Natan, "Implementing database security and auditing", Elsevier publications, 2005.*
4. *Hassan A. Afyduni, "Database Security and Auditing", Course Technology – Cengage Learning, New Delhi, 2009.*
5. *Raghu Ramakrishnan, "Database Management Systems", McGraw Hill/ Third Edition, 2003*
6. *RamezElmasri, Shamkant B. Navathe , "Fundamentals of Database System" Addison Wesley, New Delhi/Fourth Edition 2004*
7. *M. Gertz, and S. Jajodia, Handbook of Database Security- Application and Trends, 2008, Springer.*

M.TECH .
CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE14	Web Security	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To reveal the underlying in web application
- To identify and aid in fixing any security vulnerabilities during the web development
- To understand the security principles in developing a reliable web application

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Identify the vulnerabilities in the web applications
CO2	To learn the concepts of quantum cryptography
CO3	How to eradicate and recovery of cyber incidents
CO4	Able to Investigate the network forensics technologies
CO5	Apply cryptography technology in GPS and GEO tagging

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
CO4	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**1**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**
CO2	**3**	**2**	**2**
CO3	**3**	**2**	**2**
CO4	**3**	**3**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
					√				

M.TECH .
CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE14	Web Security	Ty	3	0	0	3

Unit-1 **9 Hrs**

Injection Vulnerabilities: Structured Query Language (SQL), Cross-Site Scripting (XSS). Botnets: Measurement and Disinfection, Botnet Communication Topologies, Intelligence Resources, Sandboxed Tools.

Unit-2 **9 Hrs**

Quantum Cryptography: Quantum Logic Gates, Quantum Algorithms, Physical Realization of Cubits, Single Photons, EPR Pairs.

Unit-3 **9 Hrs**

Cyber Incident Analysis and Response: Incident Preparation, Incident Detection and Analysis, Containment, Eradication, and Recovery

Unit-4 **9 Hrs**

Network Forensic Investigation: Forensic Technologies, Digital Evidence Collection, Evidentiary Reporting

Unit-5 **9 Hrs**

GPS and Geo-Tagging, Forced Disclosure of Encryption Keys, Quantum Cryptography, Visual Cryptography, Biometrics in Cyber Physical Systems, Information hiding in iOS, Hyper-visor based Malware protection.

Total Hours: 45

References:

1. Seth Fogie, Jeremiah Grossman, Robert Hansen, XSS Attacks: Cross Site Scripting Exploits and Defense, Syngress, 2007.
2. N. Namekata, S. Mori, and S. Inoue, “Quantum key distribution over an installed multimode optical fiber local area network”, Optical Express, 2005.
3. T.M.T. Nguyen, M. A. Sfaxi, and S. Ghernaouti-Hélie, "Integration of Quantum Cryptography in 802.11 Networks”, Proceedings of the FirstIntenationalConference on Availability, Reliability and Security (ARES), pp. 116-123, Vienna, April 2006.
4. Nagaraj V. Dharwadkar , B.B. Ambedker, S.R. Joshi, “Visual Cryptography for Color Image using Color Error Diffusion”, ICGSTGVIPJournal ,volume 10, issue 1,February 2010.

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE15	**Malware Analysis**	Ty	3	0	0	3

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To understand the purpose of computer infection program
- To test and exploit various malware in open source environment.
- To implement the covert channel and mechanisms.
- To analyze and design the famous virus and worms.
- To discover alternate data streams for malware detection

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Apply the malware analysis techniques
CO2	Evaluate the malwares through open source environment
CO3	Scanning the malware functionality
CO4	Apply the tools for malware analysis
CO5	Examine the forensic malware leaks

Mapping of Course Outcome with Program Outcome (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
CO4	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**1**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**1**

COs/PSOs	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**
CO2	**3**	**2**	**2**
CO3	**3**	**2**	**2**
CO4	**3**	**3**	**2**
CO5	**3**	**2**	**2**

3/2/1 Indicates Strength of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/Technical Skills	Soft Skills
					√				

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T/SLr	P/R	C
MCS20IE15	Malware Analysis	Ty	3	0	0	3

UNIT I MALWARE ANALYSIS 9 Hrs

Basic Static Techniques - Malware Analysis in Virtual Machines - Basic Dynamic Analysis - IDA Pro -Analyzing Malicious Windows Programs – Debugging

UNIT II MALWARE FUNCTIONALITY 9 Hrs

Malware Behavior - Covert Malware Launching -Data Encoding – Malware-Focused Network Signatures.

UNIT III ANTI-REVERSE-ENGINEERING 9 Hrs

Anti-Disassembly-Anti-Debugging - Anti-Virtual Machine Techniques- Packers and Unpacking.

UNIT IV CODE ANALYSIS 9 Hrs

Shell code Analysis - C++ Analysis- 64-Bit Malware – Tools for Malware Analysis

UNIT V MALWARE FORENSICS 9 Hrs

Discovering Alternate Data Streams with TSK - Detecting Hidden Files and Directories with TSK- Finding Hidden Registry Data with Microsoft's Offline API -Bypassing Poison Ivy's Locked Files Bypassing Conficker's File System ACL Restrictions - Scanning for Root kits With GMER - Detecting HTML Injection by Inspecting IE's DOM - Registry Forensics with RegRipper Plug-ins - Detecting Rogue-Installed PKI Certificates - Examining Malware that Leaks Data into the Registry.

Total Hours: 45

REFERENCES:

1. *Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious by Michael Sikorski, Andrew Honig 1st Edition.*
2. *Malware Analyst's Cookbook: Tools and Techniques for Fighting Malicious Code by Michael Ligh , Steven Adair , Blake Hartstein, Matthew Richard, 2nd Edition.*
3. *The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory by Michael Hale Ligh, Kindle Edition.*
4. *Malware Forensics Field Guide for Windows Systems: Digital Forensics Field Guides by Cameron H. Malin, Eoghan Casey, James M. Aquiline 1st Edition.*

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Audit Course I & II

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code: MET20AU01	Subject Name ENGLISH FOR RESEARCH PAPER WRITING	Ty/Lb/ETL	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives To know the art of writing the research paper and thesis to Ensure the good quality of paper at very first-time submission .

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	Understand that how to improve your writing skills and level of readability
CO2	Learn about what to write in each section
CO3	Understand the skills needed when writing a Title

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	1	1	1	1	3	1	1	1	3
CO2	1	1	1	1	1	3	1	1	1	3
CO3	1	1	1	1	1	3	1	1	1	3

COs / PSOs	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
										✓		

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AU01	English for Research Paper Writing	Ty	2	0	0	0

Unit I **6 Hrs**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit II **6 Hrs**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts .Introduction

Unit III **6 Hrs**

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check.

Unit IV **6 Hrs**

Key Skills are needed when writing a Title, Abstract, Review of the Literature, Methods, Results, Discussion and conclusion

Unit V **6 Hrs**

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Reference Books: **TOTAL HOURS: 30**

1. Goldbort R (2016) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2016) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (2018), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2017

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Subject Code: MET20AU02	**Subject Name DISASTER MANAGEMENT**	**Ty/Lb/ ETL**	**L**	**T**	**P**	**C**
	Prerequisite: Nil	Ty	2	0	0	0

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO2	develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO3	critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	1	1	1	1	1	3	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1

COs / PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
										✓		

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Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AU02	Disaster Management	Ty	2	0	0	0

Unit I **6 Hrs**

INTRODUCTION TO DISASTERS

Concepts, and definitions-Disaster, Hazard, Vulnerability, Resilience, Risks Disasters: Classification, Causes, Impacts -including social, economic, political, environmental, health, psychosocial, etc.

Unit II **6 Hrs**

RISK MANAGEMENT

Goals and objectives of ISDR Programme- Risk identification – Risk sharing – Disaster and development: Development plans and disaster management –Alternative to dominant approach –disaster-development linkages - Principle of risk partnership.

Unit III **6 Hrs**

RISK REDUCTION

Trigger mechanism – constitution of trigger mechanism – risk reduction by education – disaster information network – risk reduction by public awareness Application of various technologies: Data bases – RDBMS – Management Information systems – Decision support system and other systems – Geographic information systems Remote sensing-an insight – contribution of remote sensing and GIS - Case study.

Unit IV **6 Hrs**

INTER-RELATIONSHIPS BETWEEN DISASTERS AND DEVELOPMENT:

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources financial arrangements – areas of improvement –disaster preparedness — emergencyresponse

Unit V **6 Hrs**

DISASTER RISK MANAGEMENT IN INDIA

Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

TOTAL HOURS: 30

Text Books:

1. Pardeep Sahni, Madhavi Malalgoda and Ariyabandu, “Disaster risk reduction in South Asia”, PHI

2.Amita Sinvhal, “Understanding earthquake disasters” TMH, 2010.

References:

3. Pardeep sahni, Alka Dhameja and Uma Medury, “Disaster mitigation: Experiences and reflections”, PHI

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Audit course I&II

Subject Code: MET20AU03	Subject Name SANSKRIT FOR TECHNICAL KNOWLEDGE	Ty/Lb/ ETL	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives To get a working knowledge in illustrious Sanskrit, the scientific language in the world Learning of Sanskrit to improve brain functioning , to develop the logic in mathematics, science & other subjects enhancing the memory power. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	Understanding basic Sanskrit language
CO2	Ancient Sanskrit literature about science & technology can be understood
CO3	Being a logical language will help to develop logic in students

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PO10
CO1	1	1	1	1	1	3	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1

COs / PSOs	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
										✓		

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Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AU03	Sanskrit for Technical Knowledge	Ty	2	0	0	0

Unit I **10 hrs**

Alphabets in Sanskrit,Past/Present/Future Tense,Simple Sentences

Unit II **10 hrs**

Order,Introduction of roots,Technical information about Sanskrit Literature

Unit III **10 hrs**

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TOTAL HOURS : 30 HRS

Reference Books:

1. “Abhyaspustakam” – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi.

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Audit course I&II

Subject Code: MET20AU04	Subject Name VALUE EDUCATION	Ty/Lb/ETL	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives .Understand value of education and self- development , Imbibe good values in students . Let them should know about the importance of character

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	Knowledge of self-development
CO2	Learn the importance of Human values
CO3	Developing the overall personality

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	1	1	1	1	3	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1

COs / PSOs	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
										✓		

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Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AU04	Value Education	Ty	2	0	0	0

Unit 1: **6 Hrs**

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments

Unit 2: **6 Hrs**

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

Unit 3: **6 Hrs**

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance.

Unit 4: **6 Hrs**

True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit 5: **6 Hrs**

Character and Competence –Holy books vs Blind faith. Self-management and Good health.Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

TOTAL HOURS : 30 hrs

Reference:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

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Audit course I&II

Subject Code: MET20AU05	Subject Name : CONSTITUTION OF INDIA	Ty/Lb/ ETL	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

COURSE OUTCOMES (COs) : At the end of this course the students would be able to know

CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO3	. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO4	Discuss the passage of the Hindu Code Bill of 1956.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	1	1	1	1	3	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1
CO4	1	1	1	1	1	3	1	1	1	1

COs / PSOs	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
										✓		

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CYBER FORENSICS AND INFORMATION SECURITY

Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AU05	Constitution of India	Ty	2	0	0	0

Unit 1: **6 hrs**

History of Making of the Indian Constitution:

History Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble Salient Features

Unit 2: **6 hrs**

Contours Of Constitutional Rights & Duties:

Fundamental Rights, Right to Equality , Right to Freedom , Right against Exploitation, Right to Freedom of Religion , Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy and Fundamental Duties.

Unit 3: **6 hrs**

ORGANS OF GOVERNANCE:

Parliament Composition, Qualifications and Disqualifications, Powers and Functions Executive President, Governor Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions.

Unit 4: **6 hrs**

Local Administration:

District's Administration head: Role and Importance,Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit 4: **6 hrs**

Election Commission: Role and Functioning.Chief Election Commissioner and Election Commissioners.State Election Commission: Role and Functioning.Institute and Bodies for the welfare of SC/ST/OBC and women.

TOTAL HOURS: 30 hrs

Reference Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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Audit course I&II

Subject Code: MET20AU06	Subject Name : PEDAGOGY STUDIES	Ty/Lb/ ETL	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives Students will be able to: 4. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers. 5. Identify critical evidence gaps to guide the development.

COURSE OUTCOMES (COs) : At the end of this course the students would be able to know

CO1	What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
CO2	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
CO3	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	1	1	1	1	3	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1

COs / PSOs	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
										✓		

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Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AU06	Pedagogy Studies	Ty	2	0	0	0

Unit I: Introduction and Methodology: **6 hrs**

Aims and rationale, Policy background, Conceptual framework and terminology ,Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions**.** Overview of methodology and Searching.

Unit II:

Thematic overview: **6 hrs**

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Unit III: Evidence on the effectiveness of pedagogical practices **6 hrs**

Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit IV: Professional development: **6 hrs**

Alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

Unit V: Research gaps and future directions: **6 hrs**

Research design, Contexts, Pedagogy, Teacher education, Curriculum and Assessment, Dissemination and research impact.

TOTAL HOURS: 30

Reference Books:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher Education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

- www.pratham.org/images/resource%20working%20paper%202.pdf.

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Audit course I&II

Subject Code: MET20AU07	Subject Name: STRESS MANAGEMENT BY YOGA	Ty/Lb /ETL	L	T	P	C
	Prerequisite : **Basic Knowledge of Yoga**	Ty	2	0	0	0

To Understand the Basic Concepts of Yoga
To Gain knowledge on Ashtanga yoga
To Acquire knowledge of Techniques and Practice of Yogasanas
To Understand stress and the causes. To Attain the knowledge about stress busting through yoga

CO1	Understand the Basic Concepts of Yoga
CO2	Gain knowledge on Ashtanga yoga
CO3	To Understand stress and the causes
CO4	Acquire knowledge of Techniques and Practice of Yogasanas
CO5	Attain the knowledge about stress busting through yoga

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	1	1	1	1	3	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1
CO3	1	1	1	1	1	1	1	1	1	1
CO4	1	1	1	1	1	3	1	1	1	1
CO5	1	1	1	1	1					

COs / PSOs	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1
CO5	1	1	1

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
										✓		

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Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AU07	Stress Management by Yoga	Ty	2	0	0	0

Unit 1: **6 hrs**

What is stress - Symptoms of stress - Why is stress helpful - Why is stress harmful - Stress versus burnout - Main types of stress - Know your stressors - Tips to Manage Stress

Unit 2: **6 hrs**

Strength, Weaknesses, Opportunities and Threats (SWOT) Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem. Emotional Intelligence, What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. Managing Emotions

Unit 3: **6 hrs**

What is Yoga – Definition and Its Branches - Hatha Yoga – Kundalini Yoga – Tantra Yoga – Kriya Yoga – Introduction To Ashtanga Yoga

Unit 4: **6 hrs**

Mechanism of Stress related diseases: Psychic, Psychosomatic, Somatic and Organic phase. Role of Meditation & Pranayama on stress – physiological aspect of Meditation. Constant stress & strain, anxiety, conflicts resulting in fatigue among Executive. Contribution of Yoga to solve the stress related problems of Executive

Unit 5: **6 hrs**

Meaning and definition of Health – various dimensions of health (Physical, Mental, Social and Spiritual) – Yoga and health – Yoga as therapy. Physical fitness. Stress control exercise – Sitting meditation, Walking meditation, Progressive muscular relaxation, Gentle stretches and Massage.

TOTAL HOURS : 30 Hrs

Reference Books:

1. Andrews, Linda Wasmer., (2005). Stress Control for peace of Mind. London: Greenwich Editions Lalvani, Vimla., (1998). Yoga for stress. London: Hamlyn
2. Nagendra, H.R., and Nagarathana, R., (2004). Yoga perspective in stress management. Bangalore: Swami Vivekananda Yoga Prakashana.
3. Nagendra, H.R., and Nagarathana, R., (2004). Yoga practices for anxiety & depression. Bangalore: Swami Sukhabodhanandha Yoga Prakashana.
4. Sukhabodhanandha, Swami., (2002). Stress Management. Banglore: Prasanna trust.
5. *Udupa, K.N., (1996). Stress management by Yoga. NewDelhi: Motilal Banaridass Publishers Private Limited*

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Audit course I&II

Subject Code: MET20AU08	**Subject Name PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS**	**Ty/Lb/ ETL**	**L**	**T**	**P**	**C**
	Prerequisite: Nil	Ty	2	0	0	0

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives To learn to achieve the highest goal happily , To become a person with stable mind, pleasing personality and determination. To awaken wisdom in student

COURSE OUTCOMES (COs) : At the end of this course the students would be able to know

CO1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
CO2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity
CO3	Study of Neetishatakam will help in developing versatile personality of students.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	1	1	1	1	1	3	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1

COs / PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
										✓		

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CYBER FORENSICS AND INFORMATION SECURITY

Audit course I&II

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20AU08	Personality Development through life Enlightenment Skills	Ty	2	0	0	0

Unit 1: **10 hrs**

Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom) Verses- 29,31,32 (pride & heroism)Verses- 26,28,63,65 (virtue) Verses- 52,53,59(dont's)Verses-71,73,75,78(do's)

Unit 2: **10 hrs**

Approach to day to day work and duties.

Shrimad BhagwadGeeta: Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.

Unit 3: **10 hrs**

Statements of basic knowledge.

Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 Personality of Role model. Shrimad BhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63

Reference Books: **TOTAL HOURS : 30 Hrs**

1. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

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Open Elective

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code: MET20OE01	Subject Name BUSINESS ANALYTICS	Ty/ Lb/ ETL	L	T	P	C
	Prerequisite: Nil	TY	3	0	0	3

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives . Understand the role of business analytics within an organization. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making. To become familiar with processes needed to develop, report, and analyze business data. Use decision-making tools/Operations research techniques. Mange business process using analytical and management tools. Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	Students will demonstrate knowledge of data analytics. . Students will demonstrate the ability of think critically in making decisions based on data and deep analytics..
CO2	Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
CO3	Students will demonstrate the ability to translate data into clear, actionable insights

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	1	1	1	3	3
CO2	3	3	3	3	3	1	1	1	3	3
CO3	3	3	3	3	3	1	1	1	3	3

COs / PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
						✓						

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20OE01	Business Analytics	Ty	3	0	0	3

Unit1: Business analytics: **9 Hrs**

Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

Unit 2: Trendiness and Regression Analysis: **9 Hrs**

Modelling Relationships and Trends inData, simple Linear Regression.Important Resources, Business Analytics Personnel, Data and models for
Business analytics, problem solving, Visualizing and Exploring Data,Business Analytics Technology.

Unit 3: Organization Structures of Business analytics **9 Hrs**

Team management,Management Issues, Designing Information Policy, Outsourcing, EnsuringData Quality, Measuring contribution of Business analytics, ManagingChanges.Descriptive Analytics, predictive analytics, predicative Modelling, Predictiveanalytics analysis, Data Mining, Data Mining Methodologies, Prescriptiveanalytics and its step in the business analytics Process, PrescriptiveModelling, nonlinear Optimization.

Unit 4: Forecasting Techniques: **9 Hrs**

Qualitative and Judgmental Forecasting, StatisticalForecasting Models, Forecasting Models for Stationary Time Series,Forecasting Models for Time Series with a Linear Trend, Forecasting TimeSeries with Seasonality, Regression Forecasting with Casual Variables,Selecting Appropriate Forecasting Models.Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation UsingAnalytic Solver Platform, New-Product Development Model, NewsvendorModel, Overbooking Model, Cash Budget Model.

Unit 5: Decision Analysis: **9 Hrs**

Formulating Decision Problems, Decision Strategies withthe without Outcome Probabilities, Decision Trees, The Value ofInformation, Utility and Decision Making.Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Total Hours: 45

Reference Books:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G.Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

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Subject Code: MET20OE02	Subject Name INDUSTRIAL SAFETY	Ty/Lb/ ETL	L	T	P	C
	Prerequisite: Nil	Ty	3	0	0	3

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives . Understand policies and protections put in place to ensure plant and factory worker protection from hazards that could cause injury.

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	The different safety measures followed in the industry
CO2	Understand the fundamentals of safety policy
CO3	To understand the periodic and preventive maintenance

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	1	1	1	3	3
CO2	3	3	3	3	3	1	1	1	3	3
CO3	3	3	3	3	3	1	1	1	3	3

COs / PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
						✓						

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20OE02	Industrial Safety	Ty	3	0	0	3

Unit-I: Industrial safety: **9 hrs**

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.

Unit-II: Fundamentals of maintenance engineering: **9 hrs**

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.

Unit-III: Wear and Corrosion and their prevention: **9 hrs**

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.

Unit-IV: Fault tracing: **9 hrs**

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for 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.

Unit-V: Periodic and preventive maintenance: **9 hrs**

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

TOTAL HOURS :45

Reference Books:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

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Subject Code: MET20OE03	Subject Name: Operations Research	Ty/Lb/ETL	L	T	P	C
	Prerequisite: Nil	Ty	3	0	0	3

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives To understand the process of Optimization Techniques and Operations Research

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	understand Strategic of Inventory Control Models
CO2	To know the process of sensitivity Analysis
CO3	To familiarize Elementary Graph Theory

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	1	1	1	2	2
CO2	3	3	3	3	2	1	1	1	2	2
CO3	3	3	3	3	2	1	1	1	2	2

COs / PSOs	PSO1	PSO2	PSO3
CO1	2	2	2
CO2	2	2	2
CO3	2	2	2

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course
						✓				

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20OE03	Operations Research	Ty	3	0	0	3

Unit 1: **9 hrs**
Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit 2 **9 hrs**
Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Unit 3: **9 hrs**
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit 4 **9 hrs**
Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 5 **9 hrs**
Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References: **TOTAL HOURS: 45**

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

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code: MET20OE04	Subject Name COST MANAGEMENT OF ENGINEERING PROJECTS	Ty/Lb/ETL	L	T	P	C
	Prerequisite: Nil	Ty	3	0	0	3

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives To understand the process of planning and controlling the budget of a project or business.

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	understand Strategic Cost Management Process
CO2	Know Cost concepts in decision-making in their projects
CO3	To familiarize Quantitative techniques for cost management

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	1	1	1	2	2
CO2	3	3	3	3	2	1	1	1	2	2
CO3	3	3	3	3	2	1	1	1	2	2

COs / PSOs	PSO1	PSO2	PSO3
CO1	2	2	2
CO2	2	2	2
CO3	2	2	2

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course	
						✓					

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20OE04	Cost Management of Engineering Projects	Ty	3	0	0	3

Unit 1: Introduction: **9Hrs**

Introduction and Overview of the Strategic Cost Management Process

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Unit II: COST CONCEPTS IN DECISION-MAKING **9 Hrs**

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.

Unit III: PROJECT: **9 Hrs**

Meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. 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

Unit IV: COST BEHAVIOUR AND PROFIT PLANNING MARGINAL COSTING: **9 Hrs**

Distinction between Marginal Costing and Absorption Costing; Break-even Analysis,Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. 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 budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit V: QUANTITATIVE TECHNIQUES FOR COST MANAGEMENT: **9 Hrs**

Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Total Hours: 45

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.

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Subject Code: MET20OE05	Subject Name COMPOSITE MATERIALS	Ty/Lb/ETL	L	T	P	C
	Prerequisite: Nil	Ty	3	0	0	3

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives To understand nature of the composite material and apply them wherever required

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	Understand the nature ,types and th applications of composite materials
CO2	Understand the synthesis of different types of metal matrix materials
CO3	Understand the polymeric composite materials and the characteristic feature of composite materials

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	1	1	1	2	2
CO2	3	3	3	3	2	1	1	1	2	2
CO3	3	3	3	3	2	1	1	1	2	2

COs / PSOs	PSO1	PSO2	PSO3
CO1	2	2	2
CO2	2	2	2
CO3	2	2	2

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course		
						✓						

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Subject Code	Subject Name	Ty/Lb/ETL	L	T	P	C
MET20OE05	Composite Materials	Ty	3	0	0	3

UNIT–I: **Introduction:** **9 Hrs**

Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II: **Reinforcements:** **9 Hrs**

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.

UNIT – III: Manufacturing of Metal Matrix Composites: **9 Hrs**

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.

UNIT–IV: Manufacturing of Polymer Matrix Composites: **9 Hrs**

Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – V: Strength: **9 Hrs**

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.

Total Hours: 45

Text Books:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References :

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

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CYBER FORENSICS AND INFORMATION SECURITY

Subject Code: MET20OE06	Subject Name WASTE TO ENERGY	Ty/Lb/ ETL	L	T	P	C
	Prerequisite: Nil	TY	3	0	0	3

L : Lecture T : Tutorial P : Project R : Research C: Credits T/L: Theory/Lab

Objectives To understand the concept of producing energy from the waste material

COURSE OUTCOMES (COs) : At the end of this course the students would be able to

CO1	Understand the different type of waste which can be converted to fuel
CO2	Understand the concepts and methods of biomass pyrolysis, gasification and combustion
CO3	Understand the production and characterization of biogas technology

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	1	1	1	2	2
CO2	3	3	3	3	2	1	1	1	2	2
CO3	3	3	3	3	2	1	1	1	2	2

COs / PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Audit course
						✓				

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MET20OE06	Waste to Energy	Ty	3	0	0	3

Unit-I: Introduction to Energy from Waste: **9Hrs**
Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II: Biomass Pyrolysis: **9Hrs**
Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III: Biomass Gasification: **9Hrs**
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.

Unit-IV: Biomass Combustion: **9Hrs**
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.

Unit-V: Biogas: **9Hrs**
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.

Total Hours: 45

References Books:
1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 2018
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 2017
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 2017
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons,2018.