JAMIA HAMDARD

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CBCS ENABLED SYLLABUS
MASTER OF TECHNOLOGY
COMPUTER SCIENCE & ENGINEERING
WITH SPECIALIZATION CYBER FORENSICS AND INFORMATION SECURITY

SYLLABUS FOR MASTER OF TECHNOLOGY COMPUTER SCIENCE & ENGINEERING WITH SPECIALIZATION CYBER FORENSICS AND INFORMATION SECURITY

Choice Based credit system (CBCS)

Approval Date: 26th June 2022

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

JAMIA HAMDARD

Deemed to be University

Accredited in 'A' Grade by NAAC

Declared to be designated as Institute of Eminence (IoE) by MHRD, GOI,

New Delhi -110062

www.Jamiahamdard.edu.in

PROGRAMME NAME: MASTER OF TECHNOLOGY COMPUTER SCIENCE & ENGINEERING WITH SPECIALIZATION CYBER FORENSICS AND INFORMATION SECURITY
PROGRAME CODE: 549
ACADEMIC SESSION OF INTRODUCTION OF THE PROGRAMME: (2022-23)
SCHOOL NAME: SEST
DEPARTMENT NAME: COMPUTER SCIENCE & ENGINEERING

APPROVAL DATE OF THE BOARD OF STUDIES (BOS) MEETING FOR THE PRESENT SYLLABUS **26 JUNE 2022**
APPROVAL DATE NUMBER OF ACADEMIC COUNCIL OF MEETING FOR THE PRESENT SYLLABUS

ADMISSION & EXAMINATION
BYE-LAWS

FOR

MASTER OF TECHNOLOGY
COMPUTER SCIENCE & ENGINEERING
with specialization in
Cyber Forensics and Information Security
M.Tech. (CSE-CFIS)

Program Code: 549

CHOICE BASED CREDIT SYSTEM (CBCS)
(W.E.F. 2022-23)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
School of Engineering Sciences& Technology
JAMIA HAMDARD
(DEEMED TO BE UNIVERSITY)
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- **Approval date of the BOS meeting for the present syllabus:**

Approval date and number for the Academic Council meeting for the present syllabus

Name of Programme	Programme Code	Date of Revision
M.Tech CSE-CFIS	549	02-11-2018

SCHOOL OF EGINEERING SCIENCES AND TECHNOLOGY

Vision Statement (School Level): To become the best institution in the national and international map in terms of quality of teaching and research, technical knowledge and academics in the field Computer Science & Engineering, Electronics & Communication Engineering, Bioinformatics with sincere honesty adding values in the core aspect of students' life.

Mission Statements (3 to 4) (School Level):

MS1: To offer state-of-the-art undergraduate, postgraduate and doctoral programs in Computer Science & Engineering, Electronics and Communication Engineering & Engineering and Bioinformatics.
MS 2: To provide one of the best working environments to motivate faculty and students to work towards vision of the Department.
MS 3: To develop association with industry, other Universities/Institute/Research Laboratories and work in collaboration with them.
MS 4: To use our expertise in all the relevant disciplines for helping society in solving its real life problem.
MS 5: To develop entrepreneurship skills in the students so that they can become problem solver and innovative developer and contribute to the society by providing employment to others.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Vision Statement (Department/Centre Level): To become the best institution in the national and international map in terms of quality of teaching and research, technical knowledge and academics in the field Computer Science & Engineering, Electronics & Communication Engineering, Bioinformatics with sincere honesty adding values in the core aspect of students' life.

Mission Statements (3 to 4) (Department/Centre Level):

MS1: To offer state-of-the-art undergraduate, postgraduate and doctoral programs in Computer Science & Engineering, Electronics and Communication Engineering & Engineering and Bioinformatics.

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MS 5: To develop entrepreneurship skills in the students so that they can become problem solver and innovative developer and contribute to the society by providing employment to others.

PROGRAM EDUCATIONAL OBJECTIVES

PEO 1: To prepare professionals who will have successful career in industries, academia, research and entrepreneurial endeavors.

PEO 2: To prepare graduates who will demonstrate analytical, research, design and implementation skills offering techno-commercially feasible and socially acceptable solutions to real life problems.

PEO 3: To prepare graduates who will thrive to pursue life-long learning and contribute to society as an ethical and responsible citizen.

Mapping Program Educational Objectives (PEOs)
with Mission Statements (MS)

	MS-1	MS-2	MS-3	MS-4	MS-5
PEO-1	3	3	2	2	2
PEO-2	3	3	3	3	3
PEO-3	2	2	2	2	2

Write '3' in the box for 'high-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low-level' mapping.

PROGRAM OUTCOMES

At the end of the program a student is expected to have:

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.

PROGRAMME SPECIFIC OUTCOMES:

PSO 1: Students should be able to engage in sustainable development and demonstrate data analysis skills for effective interpretation and decision making to solve real life problems.

PSO 2: Students should be able to apply ethical principles and commit to professional and social responsibilities.

Mapping of Program Outcomes (POs) and Program Specific Outcomes (PSOs) with Program Educational Objectives (PEOs)

	PEO-1	PEO-2	PEO-3
PO-1	2	3	3
PO-2	2	3	3
PO-3	3	3	2
PO-4	2	2	3
PO-5	3	2	2
PO-6	3	3	1
PO-7	3	3	3
PO-8	2	3	3
PO-9	2	3	2
PO-10	2	2	3
PSO-1	3	2	3
PSO-2	3	1	2

Mapping of Program Specific Outcomes (PSOs) where applicable.
Write '3' in the box for 'high-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low-level' mapping.

ADMISSION & EXAMINATION RULES
for
MASTER OF TECHNOLOGY
(Computer Science & Engineering *with Specialization in Cyber Forensics & Information Security*)

M. Tech. (CSE) with specialization in Cyber Forensics & Information Security (M. Tech. (CSE) – CFIS) Program has been offered by the Department of Computer Science & Engineering.

1. PROGRAMOBJECTIVE

To prepare highly skilled professionals with a strong conceptual, theoretical& practical proficiency and research ability in the field of Computer Science & Engineering and related emerging areas; such as Data Science, Big Data Analytics, Information Security, and Cyber Forensics.

2. THE PROGRAM

Highlights of the program are described in the following table:

a.	*Name of the Programs*	M. Tech. (CSE) with specialization in *Cyber Forensics & Information Security* *M. Tech. (CSE – CFIS)*
b.	*Nature*	Regular and Full Time
c.	*Duration*	Two Years (4 Semesters)
d.	*Total number of credits*	78
e.	*Medium of Instruction and English Examinations*	English
f.	*Eligibility Criteria*	Passed B.Tech./BE or equivalent degree in Computer Science/Computer Science & Engineering/Computer Engineering/ Information Technology/Software Engineering/ ICT with atleast55% marks (or equivalent CGPA) in aggregate **(OR)** MCA or in M.Sc in IT/Computer Science/Information Science & Technology/Electronics/Software Engineering or equivalent degree with atleast55 % marks (or equivalent CGPA) in aggregate . **(OR)** B.Tech. / B.E. or equivalent degree in Electronics & Communication / Electronics Engineering / Electrical Engineering with atleast55% marks (or equivalent CGPA) in aggregate.
g.	*Selection procedure*	As per the merit of the qualifying examination
h.	*Total Seats*	30 in each program; inclusive of seats reserved for NRI / sponsored candidates; additional seats are available for Foreign Nationals.
i.	*Period of Completion*	Not more than 04 years (8 Semesters)
j.	*Commencement of the Program*	July of the every academic session

3. PROGRAM STRUCTURE

Semester-wise program structures, guidelines for teaching, practical and associatedassessments of **M. Tech. CSE-CFIS** program is described in the following tables:

Program Summary

Course Type	Abbreviation	Credits
Program Core	PC	16
Program Elective	PE	20
Open Elective (OE)	OE	4
Research Methodology & IPR	RMIPR	2
Audit Course	AC	0
Laboratory	LAB	8
Mini Project with Seminar	MPS	2
Dissertation	DISS	26
Total Credits		**78**

Semester – I

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
MTCFIS 101	Mathematical Foundations of Computer Science	PC	40	60	100	3-1-0	4
MTCFIS102	Advanced Data Structures	PC	40	60	100	3-1-0	4
	Program Elective – I	PE	40	60	100	3-1-0	4
	Program Elective – II	PE	40	60	100	3-1-0	4
MTCFIS103	Research Methodology & IPR	RMIPR	40	60	100	2-0-0	2
	Audit Course – I	AC	40	60	100	2-0-0	0
MTCFIS104	Lab– I (Advanced Data Structures)	LAB	40	60	100	0-0-4	2
MTCFIS105	Lab – II (Based on Electives)	LAB	40	60	100	0-0-4	2
Total					**800**	**16-4-8**	**22**

L-T-P stands for number of contact hours as Lecture-Tutorial-Practical in a week.

Semester – II

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
MTCFIS201	Advanced Algorithms	PC	40	60	100	3-1-0	4
MTCFIS202	Soft Computing	PC	40	60	100	3-1-0	4
	Program Elective – III	PE	40	60	100	3-1-0	4
	Program Elective – IV	PE	40	60	100	3-1-0	4
	Audit Course – II	AC	40	60	100	2-0-0	0
MTCFIS 203	Lab – III (Based on Advanced Algorithm and Soft Computing)	LAB	40	60	100	0-0-4	2
MTCFIS204	Lab – IV (Based on Elective III)	LAB	40	60	100	0-0-4	2
MTCFIS205	Mini Project with Seminar@ #	MPS	40	60	100	2-0-0	2
Total					**800**	**16-4-8**	**22**

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

Semester – III *

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
	Program Elective – V	PE	40	60	100	3-1-0	4
	Open Elective	OE	40	60	100	3-1-0	4
MTCFIS301	Dissertation – I/Industrial Project @ #	DISS	200	100	300	0-0-20	10
Total					**500**	**6-2-20**	**18**

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

Semester – IV

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
MTCFIS401	Dissertation – II @ # $	DISS	**300**	**200**	**500**	**0-0-32**	**16**

Grand Total of Credits = 78

@ *Dissertation/Mini Project shall be based on latest research topics in the broad area of research from the domain of CFIS.*

Students are required to get approval of their title of Dissertation/Mini Project by Dissertation Assessment & Evaluation committee constituted by HOD. Supervisor of respective students must be member of the above committee. Students are required to give at least two presentations/seminars for progress monitoring & assessment purpose to their respective supervisors. Viva-voce will be held only after the submission of completion report duly signed by the supervisor of the respective student. A plagiarism report duly signed by the students are mandatory to submit in compliance with UGC (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions) Regulations, 2017 (or any such regulations notified time to time) by competent authority.

$ *Students are required to publish at least one article related to their work of Dissertation in SCI/SCIE/Scopus indexed or UGC approved International Refereed Journal/International Conference. Acceptance of paper is a must for viva voce to be held, but the degree will be awarded only on proof of publication verified by the supervisor In any case consent of the Supervisor is mandatory for publication. Before submitting the paper Student* ***MUST*** *take the consent of their respective supervisor.*

PROGRAM ELECTIVES (PE)

Course Code	Course Title	Marks			L-T-P	Credits
		Internal Assessment	Semester Exam	Total		
Program Elective – I						
MTCFIS PE111	Digital Forensics	40	60	100	3-1-0	4
MTCFIS PE112	Ethical Hacking	40	60	100	3-1-0	4
MTCFIS PE113	Intrusion Detection	40	60	100	3-1-0	4
Program Elective – II						
MTCFIS PE121	Malware Analysis & Reverse Engineering	40	60	100	3-1-0	4
MTCFIS PE122	Secure Software Design & Enterprise Computing	40	60	100	3-1-0	4
MTCFIS PE123	Machine Learning	40	60	100	3-1-0	4
Program Elective – III						
MTCFIS PE231	Data Encryption & Compression	40	60	100	3-1-0	4
MTCFIS PE232	Steganography & Digital Watermarking	40	60	100	3-1-0	4
MTCFIS PE233	Information Theory & Coding	40	60	100	3-1-0	4
Program Elective – IV						
MTCFIS PE241	Security Assessment & Risk Analysis	40	60	100	3-1-0	4
MTCFIS PE242	Secure Coding	40	60	100	3-1-0	4
MTCFIS PE243	MOOCs1	40	60	100	3-1-0	4
Program Elective – V						
MTCFIS PE351	Data Warehousing & Data Mining	40	60	100	3-1-0	4
MTCFIS PE352	Web Search & Information Retrieval	40	60	100	3-1-0	4
MTCFIS PE353	MOOCs2	40	60	100	3-1-0	4

OPEN ELECTIVES (OE) COMMON FOR ALL M.TECH. PROGRAMS

Paper Code	Title of the Paper	Marks			L-T-P	Credits
		Internal Assessment	Semester Exam	Total		
Open Elective						
MTCFIS OE311	Business Analytics	40	60	100	3-1-0	4
MTCFIS OE312	Block Chain Design and Their Use Cases	40	60	100	3-1-0	4
MTCFIS OE313	Operation Research	40	60	100	3-1-0	4
MTCFIS OE314	Cost Management of Engineering Projects	40	60	100	3-1-0	4
MTCFIS OE315	IoT Fundamentals and Architecture	40	60	100	3-1-0	4
MTCFIS OE316	Numerical Methods	40	60	100	3-1-0	4

AUDIT COURSE (AC) COMMON FOR ALL M.TECH. PROGRAMS

Paper Code	Title of the Paper	Marks			L-T-P	Credits
		Internal Assessment	Semester Exam	Total		
Audit Course – I						
MTCFIS AC111	English for Research Paper Writing	40	60	100	2-0-0	0
MTCFIS AC112	Disaster Management	40	60	100	2-0-0	0
MTCFIS AC113	Pedagogy Studies	40	60	100	2-0-0	0
Audit Course – II						
MTCFIS AC221	Constitution of India	40	60	100	2-0-0	0
MTCFIS AC222	Value Education	40	60	100	2-0-0	0
MTCFIS AC223	Personality Development through Life Enlightenment Skills	40	60	100	2-0-0	0

4. MODE OF CURRICULUM DELIVERY

Mode of curriculum delivery includes classroom teaching, assignments, test, lab work, presentations, participation in relevant events and regularity.

5. ATTENDANCE

a. All students are supposed to attend every lecture and practical classes. However, the attendance requirement for appearing in the examination shall be a minimum of 75% of the classes held.

b. Each one-period teaching shall account for one attendance unit.

c. The concerned teacher will take a roll call in every scheduled class, maintains and consolidate the attendance record, which would be submitted to the Head of the Department at the conclusion of the semester.

d. Attendance on account of participation (with prior permission from the Head of the Department) in the co-curricular/extra-curricular activities can be granted by the Dean on receipt of certificates or recommendations of the respective activity issued by the Head of the Department.

e. Attendance records displayed on the Notice Board from time to time, in respect of short attendance, shall be deemed to be a proper notification and no individual notice shall be sent to the students/local guardian.

f. In case a student is found to be continuously absent from the classes without information for a period of 30 days, the concerned teacher shall report it to the Head of the Department.

g. Head of the Department may recommend for striking off the name of a student from rolls, after ensuring '**one month continuous absence**', from all the concerned teachers.

h. A student, whose name has been struck off on account of long absence may apply to the Dean for readmission within 15 days of the notice of striking off the name. The readmission shall be effected on payments of prescribed readmission fees.

i. A student with less than 75% attendance in a subject shall not be allowed to appear in that subject in the semester examination. The Head of the Department shall recommend all such cases to the Dean of the School.

j. The Dean, on the recommendation of the Head of the Department, may consider the relaxation of attendance up to 10% on account of sickness and /or any other valid reason. No application for relaxation of attendance (duly certified by a Registered Medical Practitioner/Public hospital or a competent authority) will be entertained after 15 days from the recovery from illness etc.

6. INTERNAL ASSESSMENT

a. Internal assessment, to be made by concerned teachers, will be based on unit tests, quizzes, presentation, programming test, demonstrations and assignments.

b. There will be two (2) Internal Assessment (Unit Tests) with a total of 30 marks(each of 15 marks each). Other modes of assessment (Assignment, attendance, etc) shall account for remaining 10 marks.

c. Dates for unit tests will be announced at the beginning of the semester, by the examination coordinator.

d. The teacher concerned shall maintain a regular record of the marks obtained by students in minor tests and display the same in due course.

e. The concerned teachers shall submit the compiled internal assessment marks to the Head of the Department, on the conclusion of teaching of the current semester.

f. The Head shall display a copy of the compiled sheet, of internal assessment marks of all the papers, before forwarding it to the Controller of Examination, i.e. at the conclusion of the semester.

g. A promoted candidate, who has to reappear in the examination of a paper, will retain internal assessment marks.

h. In the case of re-admission, the candidates shall have to go through the internal assessment process afresh and shall retain nothing of the previous year.

7. SEMESTER EXAMINATIONS

Prescriptions for conducting semester examinations of theory and lab papers, those shall be conducted after the conclusion of each of the semesters, are presented in the following table:

S.N.	Classification	Theory	Lab
1.	Mode	Written Only	Written, Demo, Programming and viva- voce etc.
2.	Duration	02 Hours 30 minutes	03 Hours
3.	Total Marks	60 (Sixty Only)	60 (Sixty Only)

8. DISSERTATION

a. Each student of the final semester will have to go for a Research based Dissertation work either in the industry or in the Department under the guidance of one or two faculty members.
b. Dissertation shall be based on latest research topics. In case of Specialization in CFIS, the broad area of research shall be from the domain of CFIS.
c. Students are required to get approval of their title of Dissertation by Dissertation Assessment & Evaluation committee constituted by HOD. Supervisor of respective students must be member of the above committee. Students are required to give atleast three presentations for progress monitoring & assessment purpose to their respective supervisors. Viva-voce will be held only after the submission of completion report duly signed by the supervisor of the respective student. A plagiarism report duly signed by the students are mandatory to submit in compliance with UGC (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions) Regulations, 2017 (or any such regulations notified time to time) by competent authority.

d. *Students are required to publish atleast one article related to their work of Dissertation in UGC approved International Refereed Journal/International Conference. Before submitting the paper Student* ***MUST*** *take the consent of their respective supervisor.*
e. A supervisor will be allocated to every student for dissertation work as decided by the Dissertation Committee of the Department.
f. All the students, who are pursuing the Dissertation work, shall be continuously in touch with the internal supervisor.
g. ***There shall be two presentations by the students for evaluation of the progress*** and the internal supervisors will conduct it. However, an internal supervisor may ask the student to submit a confidential progress-report from the external supervisor *(if any).*
h. All the candidates shall submit ***Three (03***) hard copies of the project reports that are duly approved and signed by internal as well as external *(if applicable)* supervisors.
i. An external examiner, appointed for the purpose, shall evaluate the project report.
j. The Head of the Department shall fix a date and time for viva-voce examinations, on receipt of the evaluation-report of the project reports from the external examiner.
k. Head of the Department shall forward the compiled total marks (awarded in internal assessment, project Report and Viva-voce Examination), in the project-semester of each of the candidate, to the Controller of Examination.

9. EXAMINATION

a. The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/ tutorials, quizzes/ viva voce and attendance. The end semester examination shall be comprised of written papers, practical and viva voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.
b. The marks obtained in a subject shall consist of marks allotted in end semester theory paper, practical examination and sessional work.
c. The minimum pass marks in each subject including sessional marks (Theory, Practical or Project etc.) shall be 50%.

10. PROMOTION SCHEME

a. A student will be required to clear minimum **40% of his/her papers**(including Labs; excluding non-credit papers) in a semester/annual examination to be eligible **for promotion to the next semester/year**. A student may appear in the supplementary examination after each semester/annual examination and can have a choice to appear in the backlog papers in the supplementary examination or in the subsequent regular semester/annual examination with a prescribed fee. A students detained due to shortage of attendance will repeat his/her paper in the subsequent semester concerned (even/odd).

b. A **detained**Studentisnot allowed to re-appear in the internal assessment (Unit test). His/her old internal assessment marks will remain same.

A student who cleared all the papers of a semester/annual examination of a programme/course will be eligible for improvement examination asper university rule.

After having passed all the FOUR semesters, the students shall be eligible for the award of M. Tech. Computer Science & Engineering with specialization in Cyber Forensics & Information Security degree of JAMIA HAMDARD.

11. THE GRADING SYSTEM

As per University Rule

12. CALCULATION OF SGPA AND CGPA OF A STUDENT IN A SEMESTER

As per University Rule

After having passed all the FOUR semesters successfully, the students shall be eligible for the award of *Master of Technology* ***M.Tech. (Computer Science & Engineering) with specialization in Cyber Forensics & Information Security M. Tech. (CSE) – CFIS***degree of JAMIA HAMDARD based on their enrollment in the respective program.

13. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The result of successful candidates, who fulfill the criteria for the award of ***Master of Technology (Computer Science & Engineering) with specialization in Cyber Forensics & Information Security M. Tech. (CSE) – CFIS*** shall be classified at the end of last semester, on the basis of his/her final CGPA (to be calculated as per university rule).

DETAILED SYLLABUS

Semester-I

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFIS101 **Title of the Course:** Mathematical Foundations of Computer Science
L-T-P: 3-1-0 CREDIT: 4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Discrete Mathematics

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:
CO-1: Understand the basic notions of discrete and continuous probability distribution, and solve the problems. (Cognitive Level: Understand)
CO-2: Describe the random samples and the sampling distributions, and analyze different types of samples. (Cognitive Level: Analyze)
CO-3: Discuss Statistical inference and multivariate statistical models, and categorize & classify the data. (Cognitive Level: Creating)
CO-4: Define and explain the basic concepts of graph theory and solve problems in almost every conceivable discipline using graph models. (Cognitive Level: Understand)
CO-5: Express & use the vector spaces and related topics. (Cognitive Level: Remember)
CO-6: Enumerate objects and solve counting problems and analyze algorithms. (Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	2	2	2	-	-	-	-	-	1	2
CO2	3	3	3	1	2	2	-	-	-	2	2	1
CO3	2	3	2	1	2	-	3	2	-	-	3	-
CO4	3	2	3	2	2	-	-	3	-	-	-	3
CO5	3	3	2	1	-	-	-	-	1	-	2	2
CO6	3	3	2	2	2	-	-	-	-	-	1	-

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I: Probability Functions and Distributions ***8 hours***

Probability mass, density, and cumulative distribution functions, Parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains.

Unit – II: Random Sample Distribution ***6 hours***

Random samples, sampling distributions of estimators**,** Methods of Moments and Maximum Likelihood.

Unit – III: Statistical Models ***6 hours***

Statistical inference**,** Introduction to multivariate statistical models: regression and classification problems, principal components analysis**,** The problem of over fitting model assessment.

Unit – IV: Graph Theory ***8 hours***

Graph Theory: Isomorphism, Planar graphs, graph coloring, Hamilton circuits and Euler cycles. Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems

Unit – V: Computer Science & Engineering Applications ***8 hours***

Computer science and engineering applications**:** Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.

Unit – VI: Recent Trends in Various Distribution Functions ***6 hours***

Recent Trends in various distribution functions in mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.

Reference Books:

- John Vince, Foundation Mathematics for Computer Science, Springer.
- K. Trivedi.Probability and Statistics with Reliability, Queuing, and Computer Science Applications. Wiley.
- M. Mitzenmacher and E. Upfal. Probability and Computing: Randomized Algorithms and
- Probabilistic Analysis.
- Alan Tucker, Applied Combinatorics, Wiley

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFIS102 **Title of the Course:** Advanced Data Structures
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: UG level course in Data Structures
Total Teaching Hours: 42 hours

COURSE OUTCOMES

The course will help students
CO1: The student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem. (Cognitive Level: Analyze)
CO2: Students should be able to understand the necessary mathematical abstraction to solve problems. (Cognitive Level: Understand)
CO3: To familiarize students with advanced paradigms and data structure used to solve algorithmic problems. (Cognitive Level: Create)
CO4: Student should be able to come up with analysis of efficiency and proofs of correctness. (Cognitive Level: Analyze)
CO5: To make students future ready for Applying Data Structure concepts in upcoming technologies. (Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	1	1		3			2	1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	1	2		2				1	2	2
CO4	3	2	1	2		2	1			3	3	3
CO5	3	3	1	2		3				1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Dictionaries & Hashing ***8 hours***
Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries. **Hashing:** Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

Unit – II: Skip Lists ***8 hours***
Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists

Unit – III: Trees ***6 hours***

Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees

Unit – IV: Text Processing ***8 hours***

Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

Unit – V: Computational Geometry ***6 hours***

Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadtrees, k-D Trees.

Unit – VI: Recent Trends in Hashing, Trees & Computational Geometry ***6 hours***

Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem.

Text/ Reference Books:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich Roberto Tamassia, Algorithm Design, John Willey, 2002.

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFIS103 **Title of the Course:** Research Methodology & IPR
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Statistics

COURSE OUTCOMES

The course will help students
CO1: Understand some basic concepts of research and its methodologies (Cognitive Level: Understand)
CO2: Identify appropriate research topics. (Cognitive Level: Remember)
CO3: Select and define appropriate research problem and parameters. (Cognitive Level: Create)
CO4: Prepare a project proposal (to undertake a project). (Cognitive Level: Create)
CO5: Organize and conduct research (advanced project) in a more appropriate manner. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	1	1	1	3				1	3	3
CO2	3	3	1	1		2	1		1	1	2	3
CO3	3	3	1	2		2		2		1	3	3
CO4	3	3	1	2		2				1	3	3
CO5	3	3	1	2		3				1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Research Problem, Scope & Objectives ***8 hours***
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit – II: Effective Literature Studies ***6 hours***
Effective literature studies approaches, analysis Plagiarism, Research ethics

Unit – III: Effective Technical Writing ***8 hours***

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit – IV: Nature of Intellectual Property ***6 hours***

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT

Unit – V: Patent Rights ***6 hours***

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

Unit – VI: New Developments in IPR ***6 hours***

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Text/ Reference book:

- Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction" Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
- Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
- Mayall , "Industrial Design", McGraw Hill, 1992.
- Niebel , "Product Design", McGraw Hill, 1974.
- Asimov , "Introduction to Design", Prentice Hall, 1962.
- Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
- T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFIS104
Title of the Course: Advanced Data Structure Lab
L-T-P: 0-0-4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)

CO1: Able to design and implement the basic as well as advanced data structures.
CO2: Searching and sorting are ore emphasized using advanced data structure.
CO3: Able to implement Text Data Processing Techniques using BOYER Algorithms.
CO4: To learn efficient use of Hash Tables.
CO5: Able to implement Text Data Processing Techniques using LCS Algorithms.

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOME

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2
CO 1	1	2	3	1	3	2	1	2	2	3	2	1
CO 2	3	2	2	2	2	2	1	3	3	2	1	3
CO 3	2	2	1	3	1	3	2	1	2	2	3	2
CO 4	-	2	2	3	3	3	3	1	2	3	2	3
CO 5	-	-	2	1	4	2	1	1	2	3	1	2

List of Program

1. Implementation of Traversal, Insertion, Deletion, Searching, Sorting in Linked list.
2. Implementation of stacks (PUSH, POP,SEARCH and SORT)
3. Implementation of Queues (Enque, Deque, Search and Sort)
4. Implementation of binary search Tree.
5. Implementation of Height Balanced Tree and calculation of balance factor.
6. Implementation of Red- Black Trees.
7. Implementation of Splay Tree.
8. Updating, deletion and creation of a hash table.
9. Implement Boyer-Moore Algorithm for Text Processing.
10. Implement LCS Algorithm for Text Processing.

Teaching-Learning Strategies in brief

1. Build openness and positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Create collaborative environment among students.
4. Encourage students to ask questions and clarify doubts.
5. Motivate the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. Giving assignments and Quizzes based on the subject.
2. Conducting viva.
3. Mid Term assessment and semester examination.
4. Internal assessment **(40 Marks) & Semester Examination (60 Marks)** &Total Marks-100.

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Name: Machine Learning Lab (Lab Based on Elective-I)
Course Code: MTCFIS 105

L-T-P: 0-0-4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Credits: 2

CO-1: Understand modern notions in predictive data analysis
CO-2: Select data, model selection, model complexity and identify the trends
CO-3: Understand a range of machine learning algorithms along with their strengths and weaknesses
CO-4: Build predictive models from data and analyze their performance

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	2	2	2	-	-	-	-	2	1	2
CO2	3	3	3	1	2	2	-	-	-	1	2	1
CO3	2	3	2	1	2	-	3	2	-	1	3	-
CO4	3	2	3	2	2	-	-	3	-	2	-	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

List of Programs

1. Write a python program to compute
   - Central Tendency Measures: Mean, Median, Mode
   - Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for ML application such as Pandas and Matplotlib
4. Write a Python program to implement Simple Linear Regression.
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn.
6. Implementation of Decision tree using sklearn and its parameter tuning
7. Implementation of KNN using sklearn
8. Implementation of Logistic Regression using sklearn
9. Implementation of K-Means Clustering
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

Teaching-Learning Strategies in brief

1. Build openness and positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Create collaborative environment among students.
4. Encourage students to ask questions and clarify doubts.
5. Motivate the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. Giving assignments and Quizzes based on the subject.
2. Conducting viva.
3. Mid Term assessment and semester examination.
4. Internal assessment **(40 Marks) & Semester Examination (60 Marks)** &Total Marks-100.

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFIS201 **Title of the Course:** Advanced Algorithms
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Algorithm Design & Analysis

COURSE OUTCOMES

CO-1: Analyze the complexity and performance of different algorithms in different contexts. (Cognitive Level :Analyze)
CO-2: Determine the appropriate data structure for solving a particular set of problems. (Cognitive Level: Understand)
CO-3: Create and identify the computational issues and apply suitable algorithms to solve it effectively. (Cognitive Level: Create)
CO-4: Design and implement optimized algorithmic solutions in real world problems involving large data sets and artificial intelligence. (Cognitive Level: Understand)
CO-5: Design efficient and effective algorithmic solutions for different real world problems. (Cognitive Level: Remember)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	3	3	3	1				1	1	
CO2	3	3	3	3	3	1	1				2	
CO3	3	3	3	3	3	1		2			2	
CO4	3	3	3	3	3	1					3	2
CO5	3	3	3	3	3	1			1		3	

3-High Level, 2-Medium Level, 1-Low Level

Detailed Syllabus

Unit 1: ***8 hours***
Theory of NP- Hard and NP-Complete Problems P, NP and NP-Complete complexity classes; Introduction to a few NPCompleteness proofs, Other complexity classes

Unit 2: ***10 hours***
Sorting: Review of various sorting algorithms, topological sorting Graph, Definitions and Elementary Algorithms, Shortest path by BFS, DFS.
Algorithms Types and their Applications, Simple recursive algorithms.
Backtracking algorithms. Divide and conquer algorithms. Dynamic programming algorithms.
Greedy algorithms. Branch and bound algorithms. Brute force algorithms. Randomized algorithms.

Unit 3: ***8 hours***

Introduction to greedy paradigm, knapsack algorithm, Minimum spanning tree. Application to MST.

Unit 4: ***8 hours***

Shortest Path in Graphs, Dynamic programming paradigm, Examples of dynamic programming.

Unit 5: ***8 hours***

Algorithms for large data sets, Applications in Data Science and AI, Common algorithms for large data sets.

Reference Books:

- Introduction to Algorithms, Cormen, Leiserson, Rivest, Stein.
- The Design and Analysis of Computer Algorithms, Aho, Hopcroft, Ullman.
- Algorithm Design, Kleinberg and Tardos.
- Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.

Teaching-Learning Strategies in brief

1. Providing examples, real life scenarios etc through online references, animation, slide show and video
2. Making groups for peer to peer learning and enabling discussions for motivating coordination and team-player skills

Assessment methods and weightages in brief

1. Assessing different groups through presentation and oral questionnaires
2. Assessing through quizzes for better objective evaluation
3. Sessional examination (2 Nos.)
4. Assignments.
5. Class tests
6. Semester examination
7. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)

Course Code: MTCFIS202 **Title of the Course:** Soft Computing
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Basic Knowledge of Mathematics
Total Teaching Hours: 40 hours

COURSE OUTCOMES

After completing this Course, the students should be able to

CO-1: Identify and describe soft computing techniques and their roles in building intelligent machines. (Cognitive Level :Understand)
CO 2: Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems. (Cognitive Level :Apply)
CO-3: Analyze the effectiveness of using Neural Networks for solving real life problems. (Cognitive Level :Analyze)
CO 4: Explain the application of genetic algorithms to combinatorial optimization problems. (Cognitive Level :Understand)
CO 5: Evaluate and compare solutions by various soft computing approaches for a given problem. (Cognitive Level :Evaluate)
CO-6: Design deep learning based models for solving various machine learning problems. (Cognitive Level :Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	1	1	2	1	1	1	1	1	1	3	1
CO2	2	3	3	3	2	1	1	1	1	1	3	1
CO3	3	2	2	2	3	1	2	1	1	2	2	1
CO4	2	3	2	3	3	2	1	2	2	1	3	1
CO5	2	2	3	2	2	1	2	1	1	1	3	1
CO6	3	3	2	2	3	1	1	2	2	2	3	1

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Introduction To Soft Computing And Neural Networks ***8 hours***

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

Unit – II: Fuzzy Logic ***8 hours***

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: Neural Networks ***6 hours***

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: Genetic Algorithms ***6 hours***

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

Unit – V: Matlab/Python Lib ***6 hours***

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

Unit – VI: Recent Trends in Deep Learning ***6 hours***

Recent Trends in deep learning, various classifiers, neural networks and genetic algorithm. Implementation of recently proposed soft computing techniques.

Text/ Reference book:

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

Teaching-Learning Strategies in brief

1. Providing examples, real life scenarios etc through online references, animation, slide show and video
2. Making groups for peer to peer learning and enabling discussions for motivating coordination and team-player skills

Assessment methods and weightages in brief

1. Assessing different groups through presentation and oral questionnaires
2. Assessing through quizzes for better objective evaluation
3. Sessional examination (2 Nos.)
4. Assignments.
5. Class tests
6. Semester examination
7. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Program: M.Tech (CFIS)
Course Code: MTCFIS 203
Title of the Course: Lab III Lab Based on Core (Advanced Algorithms/Soft Computing)
L-T-P: 0-0-4
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to understand concept of different approaches of algorithms
CO2: Able to design clean and optimized codes.
CO3: Able to design and code algorithms based on brute force, greedy and divide and conquer and dynamic programming approaches (Cognitive level: create).
CO4: Able to identify syntax and semantics and logical issues in codes (Cognitive level: understand).
CO5: Able to understand the code complexity and create and design low complexity codes (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PS O1	PS O2
CO1	1	1	-	-	-	-	1	1	2	1	1	1
CO2	-	1	3	-	1	-	2	1	-	1	2	2
CO3	1	1	3	1	-	1	-	2	1	2	3	2
CO4	-	1	-	-	1	-	1	-	-	-	1	1
CO5	1	-	3	-	-	1	1	1	1	2	1	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

List of experiments

1. Write a program to implement merge sort and binary search algorithms.
2. Write a program to implement LCS approach
3. Write a program to implement Dijkstra Algorithm
4. Write a program to 8 Queen Problem and activity selection problem.
5. Write a program to implement magic square of order 3X3
6. Write a program in python to implement all logic gates.
7. Write a program in python to Implement Perceptron Learning Algorithm.
8. Write a program to implement SVM classification by using the concept of Fuzzy concepts.
9. Write a program to implement a Fuzzy Controller for Washing Machines.
10. Write a program in python to implement Hebb's and Delta rules.

Teaching-Learning Strategies in brief

1. Build openness and positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Create collaborative environment among students.
4. Encourage students to ask questions and clarify doubts.
5. Motivate the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. Giving assignments and Quizzes based on the subject.
2. Conducting viva.
3. Mid Term assessment and semester examination.
4. Internal assessment **(40 Marks) & Semester Examination (60 Marks)** &Total Marks-100.

Name of The Course: M. Tech. (CSE)
Course Code: MTCFIS 204
Title of the Course: Data encryption and compression lab
L-T-P: 0-0-4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Credits: 2

VIRTUAL LAB PROGRAM (https://cse29-iiith.vlabs.ac.in/)

1. Breaking the Shift Cipher
2. Breaking the Mono-alphabetic Substitution Cipher
3. One-Time Pad and Perfect Secrecy
4. Message Authentication Codes
5. Cryptographic Hash Functions and Applications
6. Symmetric Key Encryption Standards (DES)
7. Symmetric Key Encryption Standards (AES)
8. Diffie-Hellman Key Establishment
9. Public-Key Cryptosystems (PKCSv1.5)
10. Digital Signatures

Python Program

1. **WAP** to perform encryption and decryption using the following algorithms:
   a) Ceaser Cipher
   b) Hill Cipher
2. W.A.P. to implement Simple RSA Algorithm with small numbers
3. WAP to Implement the Diffie-Hellman Exchange algorithm.
4. Calculate the message digest of a text using the SHA-1 algorithm in JAVA/Python

Teaching-Learning Strategies in brief

1. Build openness and positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Create collaborative environment among students.
4. Encourage students to ask questions and clarify doubts.
5. Motivate the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. Giving assignments and Quizzes based on the subject.
2. Conducting viva.
3. Mid Term assessment and semester examination.
4. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

PROGRAM ELECTIVES

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE111 **Title of the Course:** Digital Forensics
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Cybercrime and Information Warfare, Computer Networks
Total Teaching Hours: 40 hours

COURSE OUTCOMES

CO-1: Provides an in-depth study of the rapidly changing and fascinating field of computer forensics. (Cognitive Level :Understand)
CO-2: Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes. (Cognitive Level :Evaluate)
CO-3: Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools. (Cognitive Level :Understand)
CO-4: E-evidence collection and preservation, investigating operating systems and file systems network forensics, art of steganography and mobile device forensics. (Cognitive Level :Create)
CO-5: File systems network forensics, art of steganography and mobile device forensics. (Cognitive Level :Remember)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	2	3	2	3					3	3	1
CO2	2	3	3	3	3			1		2	3	1
CO3	3	1	3	2	3	2			1	3	3	1
CO4	3	3	3	3	3		1		2	2	3	1
CO5	2	3	1	3	3	2				3	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I: Digital Forensics Science ***6 hours***

Digital Forensics Science: Forensics science, computer forensics, and digital forensics.
Computer Crime: Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics

Unit – II: Cyber Crime Scene Analysis ***6 hours***

Cyber Crime Scene Analysis: Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

Unit – III: Evidence Management & Presentation ***8 hours***

Evidence Management & Presentation: Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.

Unit – IV: Computer Forensics ***8 hours***

Computer Forensics: Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, Complete a case, Critique a case, Network Forensics: open-source security tools for network forensic analysis, requirements for preservation of network data.

Unit –V: Mobile Forensics ***6 hours***

Mobile Forensics: mobile forensics techniques, mobile forensics tools. Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008.

Unit – VI: Recent Trends ***6 hours***

Recent trends in mobile forensic technique and methods to search and seizure electronic evidence

Text/ Reference Books:

- John Sammons, The Basics of Digital Forensics, Elsevier
- John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE112 **Title of the Course:** Ethical Hacking
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Computer Programming, Web Programming, Computer Networks
Total Teaching Hours: 40 hours

COURSE OUTCOMES

CO-1: Introduces the concepts of Ethical Hacking and gives the students the opportunity to learn about different tools and techniques in Ethical hacking and security. (Cognitive Level :Remember)

CO-2: Practical implementation some of the tools. (Cognitive Level :Analyze)

CO-3: Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes. (Cognitive Level :Analyze)

CO-4: Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools. (Cognitive Level :Apply)

CO-5: E-evidence collection and preservation, investigating operating systems and file systems network forensics, art of steganography and mobile device forensics. (Cognitive Level :Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Introduction to Ethical Disclosure ***6 hours***

Ethics of Ethical Hacking, Ethical Hacking and the legal system, Proper and Ethical Disclosure

Unit – II: Penetration Testing and Tools ***6 hours***

Using Metasploit, Using BackTrackLiveCD Linux Distribution

Unit – III: Vulnerability Analysis ***6 hours***

Passive Analysis, Advanced Static Analysis with IDA Pro, Advanced Reverse Engineering

Unit – IV: Client-Side Vulnerability ***8 hours***

Client-side browser exploits, Exploiting Windows Access Control Model for Local Elevation Privilege, Intelligent Fuzzing with Sulley, From Vulnerability to Exploit

Unit – VMalware Analysis ***8 hours***

Collecting Malware and Initial Analysis, Hacking Malware

Unit – VI: Case Study of Vulnerability over Cloud ***6 hours***

Case study of vulnerability over cloud platforms and mobile platforms & devices.

Text/ Reference Books:

- Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Gray Hat Hacking: The Ethical Hackers' Handbook, TMH Edition
- Jon Erickson, Hacking: The Art of Exploitation, SPD

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE113 **Title of the Course:** Intrusion Detection
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Computer Networks, Computer Programming

COURSE OUTCOMES

CO-1: Compare alternative tools and approaches for Intrusion Detection. (Cognitive Level :Analyze)

CO-2: Quantitative analysis to determine the best tool or approach to reduce risk from intrusion. (Cognitive Level :Analyze)

CO-3: Identify and describe the parts of all intrusion detection systems. (Cognitive Level :Apply)

CO-4: Characterize new and emerging IDS technologies according to the basic capabilities all intrusion detection systems share. (Cognitive Level :Remember)

CO-5: Understand ethics behind hacking and vulnerability disclosure. (Cognitive Level :Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	3	-	-	-	-	3	3	3	3	1
CO2	2	3	3	3	3	-	-	-	-	2	1	3	3	1
CO3	3	3	3	2	3	-	-	-	-	3	1	3	3	1
CO4	3	3	3	3	3	-	-	-	-	2	1	3	3	1
CO5	2	3	3	3	3	-	-	-	-	3	1	3	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I: Threats against Computers and Networked Systems ***6 hours***

The state of threats against computers and networked systems-Overview of computer security solutions and why they fail-Vulnerability assessment, firewalls, VPN's -Overview of Intrusion Detection and Intrusion PreventionNetwork and Host-based IDS

Unit – II: Classes of Attacks ***8 hours***

Classes of attacks - Network layer: scans, denial of service, penetration. Application layer: software exploits, code injection-Human layer: identity theft, root access-Classes of attackers-Kids/hackers/sop Hesitated groups-Automated: Drones, Worms, Viruses

Unit – III:Intrusion Detection System ***6 hours***

A General IDS model and taxonomy, Signature-based Solutions, Snort, Snort rules, Evaluation of IDS, Cost sensitive IDS

Unit – IV: Anomaly Detection Systems ***8 hours***

Anomaly Detection Systems and Algorithms-Network Behavior Based Anomaly Detectors (rate based)-Host-based Anomaly Detectors-Software VulnerabilitiesState transition, Immunology, Payload Anomaly Detection

Unit – V: Attack Trees ***6 hours***

Attack trees and Correlation of alerts-Autopsy of Worms and Botnets-Malware detection-Obfuscation, polymorphism-Document vectors

Unit – VI: Email Security Issues ***8 hours***

Email/IM security issues-Viruses/Spam-From signatures to thumbprints to zeroday detection-Insider Threat issues-Taxonomy-Masquerade and Impersonation Traitors, Decoys and Deception-Future: Collaborative Security

Text/ Reference Books:

- The Art of Computer Virus Research and Defense, Peter Szor, Symantec Press ISBN 0-321-30545-3
- Crimeware, Understanding New Attacks and Defenses, Markus Jakobsson and ZulfikarRamzan, Symantec Press, ISBN: 978-0-321-50195-0 2008

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFSIPE121 **Title of the Course:** Malware Analysis & Reverse Engineering
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Computer Programming

COURSE OBJECTIVE

Co-1: The objective of this course is to provide an insight to fundamentals of malware analysis. (Cognitive Level :Understand)

Co-2: Includes analysis of JIT compilers for malware detection in legitimate code. (Cognitive Level :Remember)

Co-3: DNS filtering and reverse engineering is included. (Cognitive Level :Understand)

Co-4: Provides an in-depth study of the rapidly changing and fascinating field of computer forensics. (Cognitive Level :Analyze)

Co-5: Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes. (Cognitive Level :Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Malware Analysis ***8 hours***

Fundamentals of Malware Analysis (MA), Reverse Engineering Malware (REM) Methodology, Brief Overview of Malware analysis lab setup and configuration, Introduction to key MA tools and techniques, Behavioral Analysis vs. Code Analysis, Resources for Reverse-Engineering Malware (REM) Understanding Malware Threats, Malware indicators, Malware Classification, Examining ClamAVSignatures, Creating Custom ClamAV Databases, Using YARA to Detect

Malware Capabilities, Creating a Controlled and Isolated Laboratory, Introduction to MA Sandboxes, Ubuntu, Zeltser'sREMnux, SANS SIFT, Sandbox Setup and Configuration New Course Form, Routing TCP/IP Connections, Capturing and Analyzing Network Traffic, Internet simulation using INetSim, Using Deep Freeze to Preserve Physical Systems, Using FOG for Cloning and Imaging Disks, Using MySQL Database to Automate FOG Tasks, Introduction to Python ,Introduction to x86 Intel assembly language, Scanners: Virus Total, Jotti, and NoVirus Thanks, Analyzers: Threat Expert, CWSandbox, Anubis, Joebox, Dynamic Analysis Tools: Process Monitor, Regshot, HandleDiff, Analysis Automation Tools: Virtual Box, VM Ware, Python , Other Analysis Tools

Unit – II: Malware Forensics ***6 hours***

Using TSK for Network and Host Discoveries, Using Microsoft Offline API to Registry Discoveries , Identifying Packers using PEiD, Registry Forensics with Reg Ripper Plu-gins:, Bypassing Poison Ivy's Locked Files, Bypassing Conficker's File System ACL Restrictions, Detecting Rogue PKI Certificates.

Unit -III: Malware and Kernel Debugging ***8 hours***

Opening and Attaching to Processes, Configuration of JIT Debugger for Shellcode Analysis, Controlling Program Execution, Setting and Catching Breakpoints, Debugging with Python Scripts and Py Commands, DLL Export Enumeration, Execution, and Debugging, Debugging a VMware Workstation Guest (on Windows), Debugging a Parallels Guest (on Mac OS X). Introduction to WinDbg Commands and Controls, Detecting Rootkits with WinDbgScripts, Kernel Debugging with IDA Pro.

Unit -IV: Memory Forensics and Volatility ***8 hours***

Memory Dumping with MoonSols Windows Memory Toolkit, Accessing VM Memory Files Overview of Volatility, Investigating Processes in Memory Dumps, Code Injection and Extraction, Detecting and Capturing Suspicious Loaded DLLs, Finding Artifacts in Process Memory, Identifying Injected Code with Malfind and YARA.

Unit -V:Researching and Mapping Source Domains/IPs ***6 hours***

Using WHOIS to Research Domains, DNS Hostname Resolution, Querying Passive DNS, Checking DNS Records, Reverse IP Search New Course Form, Creating Static Maps, Creating Interactive Maps.

Unit VI: Case Study of Finding Artifacts ***6 hours***

Case study of Finding Artifacts in Process Memory, Identifying Injected Code with Malfind and YARA

Text/ Reference Books:

- Michael Sikorski, Andrew Honig "Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software" Publisher William Pollock

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE122 **Title of the Course:** Secure Software Design & Enterprise Computing
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Computer Programming, Software Engineering

COURSE OUTCOMES

CO-1: To fix software flaws and bugs in various software. (Cognitive Level :Understand)
CO-2: To make students aware of various issues like weak random number generation, information leakage, poor usability, and weak or no encryption on data traffic. (Cognitive Level :Understand)
CO-3: Techniques for successfully implementing and supporting network services on an enterprise scale. (Cognitive Level :Apply)
CO-4: Techniques for successfully implementing and supporting network services Heterogeneous systems environment. (Cognitive Level :Apply)
CO-5: Methodologies and tools to design and develop secure software containing minimum vulnerabilities and flaws. (Cognitive Level :Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Secure Software Design ***6 hours***
Secure Software Design: Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts, Perform security testing and quality assurance.

Unit – II: Enterprise Application Development ***8 hours***
Enterprise Application Development: Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an

enterprise system, Design and develop a multi-tier solution to a problem using technologies used in enterprise system, Present software solution.

Unit – III: Enterprise Systems Administration ***8 hours***

Enterprise Systems Administration: Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).

Unit – IV: Troubleshooting ***6 hours***

Obtain the ability to manage and troubleshoot a network running multiple services, Understand the requirements of an enterprise network and how to go about managing them.

Unit –V: SQL Injection ***6 hours***

Handle insecure exceptions and command/SQL injection, Defend web and mobile applications against attackers, software containing minimum vulnerabilities and flaws.

Unit – VI: Case Study ***6 hours***

Case study of DNS server, DHCP configuration and SQL injection attack.

Text/ Reference Books:

- Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett
- Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security, Addison Wesley.

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE123 **Title of the Course:** Machine Learning
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Artificial Intelligence

COURSE OUTCOME

CO-1: To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IoT nodes. (Cognitive Level :Understand)
CO-2: To design and analyse various machine learning algorithms and techniques with a modern outlook focusing on recent advances. (Cognitive Level :Understand)
CO-3: Explore supervised and unsupervised learning paradigms of machine learning. (Cognitive Level :Remember)
CO-4: To explore Deep learning technique and various feature extraction strategies. (Cognitive Level :Create)
CO-5: Design experiments to evaluate and compare different machine learning techniques on real-world problems. (Cognitive Level :Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	2	1	2	1	1	1	1	1	1	3	1
CO2	2	3	3	3	2	2	1	2	1	1	3	2
CO3	3	2	2	2	3	2	2	1	2	2	2	1
CO4	2	3	2	2	2	2	1	2	2	1	3	2
CO5	2	2	3	2	2	1	2	1	1	1	3	1

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Supervised Learning ***8 hours***

Supervised Learning (Regression/Classification) - Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes - Linear models: Linear Regression, Logistic Regression, Generalized Linear Models; Support Vector Machines, Nonlinearity and Kernel Methods; Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.

Unit – II: Clustering ***6 hours***

Clustering: K-means/Kernel K-means; Dimensionality Reduction: PCA and kernel PCA; Matrix Factorization and Matrix Completion; Generative Models

Unit – III: Evaluating Machine Learning ***8 hours***

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests).

Unit – IV: Sparse Modeling & Estimation ***6 hours***

Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning

Unit – V: Scalable Machine Learning ***8 hours***

Scalable Machine Learning (Online and Distributed Learning A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference.

Unit – VI: Recent Trends in various learning technique ***6 hours***

Recent trends in various learning techniques of machine learning and classification methods for IOT applications. Various models for IOT applications.

Text/ Reference Books:

- Tom M. Michell, Machine Learning, McGraw Hills
- AurÈlien GÈron, Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems, Orielly Publications
- Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
- Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE231 **Title of the Course:** Data Encryption & Compression
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Image Processing, Linear Algebra, Cryptography

COURSE OUTCOMES

CO-1: This course will cover the concept of security. (Cognitive Level :Understand)
CO-2: Types of attack experienced, encryption and authentication for deal with attacks. (Cognitive Level :Remember)
CO-3: data compression, need and techniques of data compression. (Cognitive Level :Create)
CO-4: To learn data transformations and segmentation to solve statistical problems. (Cognitive Level :Analyze)
CO-5: Able to extract the data for performing the Analysis. (Cognitive Level :Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	3	-	-	-	-	3	3	3	3	1
CO2	2	3	3	3	3	-	-	-	-	2	1	3	3	1
CO3	3	3	3	2	3	-	-	-	-	3	1	3	3	1
CO4	3	3	3	3	3	-	-	-	-	2	1	3	3	1
CO5	2	3	3	3	3	-	-	-	-	3	1	3	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I: Introduction to Security ***6 hours***

Need for security, Security approaches, Principles of security, Types of attacks. Encryption Techniques: Plaintext, Cipher text, Substitution & Transposition techniques, Encryption & Decryption, Types of attacks, Key range & Size.

Unit -II:Symmetric& Asymmetric Key Cryptography ***8 hours***

Symmetric & Asymmetric Key Cryptography: Algorithm types & Modes, DES, IDEA, Differential & Linear Cryptanalysis, RSA, Symmetric & Asymmetric key together, Digital signature, Knapsack algorithm. User Authentication Mechanism: Authentication basics, Passwords, Authentication tokens, Certificate based & Biometric authentication, Firewall.

Unit -III:Case Studies Of Cryptography: ***8 hours***

Case Studies Of Cryptography: Denial of service attacks, IP spoofing attacks, Secure inter branch payment transactions, Conventional Encryption and Message Confidentiality, Conventional Encryption Principles, Conventional Encryption Algorithms, Location of Encryption Devices, Key Distribution. Public Key Cryptography and Message Authentication: Approaches to Message Authentication, SHA-1, MD5, Public-Key Cryptography Principles, RSA, Digital, Signatures, Key Management.

Unit -IV: Data Compression ***8 hours***

Introduction: Need for data compression, Fundamental concept of data compression & coding, Communication model, Compression ratio, Requirements of data compression, Classification. Methods of Data Compression: Data compression-- Loss less &Lossy

Unit-V: Entropy Encoding ***6 hours***

Entropy encoding-- Repetitive character encoding, Run length encoding, Zero/Blank encoding; Statistical encoding-- Huffman, Arithmetic & Lempel-Ziv coding; Source encoding-- Vector quantization (Simple vector quantization & with error term); Differential encoding—Predictive coding, Differential pulse code modulation, Delta modulation, Adaptive differential pulse code modulation; Transform based coding : Discrete cosine transform & JPEG standards; Fractal compression

Unit-VI: Recent Trends ***6 hours***

Recent trends in encryption and data compression techniques.

Text/ Reference Books:

1. Cryptography and Network Security by B. Forouzan, McGraw-Hill.
2. The Data Compression Book by Nelson, BPB.
3. Cryptography & Network Security by AtulKahate, TMH.

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE232 **Title of the Course:** Steganography and Digital Watermarking
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Image and Video Processing, Linear Algebra

COURSE OUTCOMES

CO-1: The objective of course is to provide a insight to steganography techniques. (Cognitive Level :Understand)

CO-2: Watermarking techniques along with attacks on data hiding and integrity of data is included in this course. (Cognitive Level :Understand)

CO-3: Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces. (Cognitive Level :Understand)

CO-4: Be familiar with the design technologies for individuals and persons with disabilities. (Cognitive Level :Analyze)

CO-5: Learn the guidelines for user interface. (Cognitive Level :Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Introduction to Steganography ***6 hours***

Overview, History, Methods for hiding (text, images, audio, video, speech etc.), Issues: Security, Capacity and Imperceptibility, Steganalysis: Active and Malicious Attackers, Active and passive steganalysis,

Unit-II: Steganography Framework ***8 hours***

Frameworks for secret communication (pure Steganography, secret key, public key steganography), Steganography algorithms (adaptive and non-adaptive),

Unit-III:Steganography techniques ***8 hours***

Steganography techniques: Substitution systems, Spatial Domain, Transform domain techniques, Spread spectrum, Statistical steganography, Cover Generation and cover selection, Tools: EzStego, FFEncode, Hide 4 PGP, Hide and Seek, S Tools etc.)

Unit-IV: Detection & Distortion Techniques ***6 hours***

Detection, Distortion, Techniques: LSB Embedding, LSB Steganalysis using primary sets, Texture based

Unit-V: Digital Watermarking ***6 hours***

Introduction, Difference between Watermarking and Steganography, History, Classification (Characteristics and Applications), Types and techniques (Spatial-domain, Frequency-domain, and Vector quantization based watermarking), Attacks and Tools (Attacks by Filtering, Remodulation, Distortion, Geometric Compression, Linear Compression etc.), Watermark security & authentication.

Unit-VI: Recent Trends ***6 hours***

Recent trends in Steganography and digital watermarking techniques. Case study of LSB Embedding, LSB Steganalysis using primary sets.

Text/ Reference Books:

1. Peter Wayner, "Disappearing Cryptography–Information Hiding: Steganography & Watermarking", Morgan Kaufmann Publishers, New York, 2002.
2. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, TonKalker, "Digital Watermarking and Steganography", Margan Kaufmann Publishers, New York, 2008.
3. Information Hiding: Steganography and Watermarking-Attacks and Countermeasures by Neil F. Johnson, ZoranDuric, SushilJajodia
4. Information Hiding Techniques for Steganography and Digital Watermarking by Stefan Katzenbeisser, Fabien A. P. Petitcolas

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE233 **Title of the Course:** Information Theory and Coding
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Probability Theory, Computer Networks

COURSE OUTCOMES

CO-1: The objective of this course is to provide an insight to information coding techniques. (Cognitive Level :Understand)
CO-2: Error correction mechanism. (Cognitive Level :Evaluate)
CO-3: Various compression techniques for text, video and image are covered for thorough knowledge of efficient information conveying systems. (Cognitive Level :Analyze)
CO-4: Be familiar with the design technologies for individuals and persons with disabilities. (Cognitive Level :Remember)
CO-5: Learn the guidelines for user interface. (Cognitive Level :Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	3	1				3	3	3	3	1
CO2	2	3	3	3	3					2	1	3	3	1
CO3	3	3	3	2	3	1	2		2	3	1	3	3	1
CO4	3	3	3	3	3					2	1	3	3	1
CO5	2	3	3	3	3			1		3	1	3	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I:Information& Entropy Theory ***8 hours***

Information and entropy information measures, Shannon's concept of Information. Channel coding, channel mutual information capacity (BW),

Unit-II: Error Detection & Correction ***8 hours***

Theorem for discrete memory less channel, information capacity theorem, Error detecting and error correcting codes,

Unit-III: Types of Codes ***8 hours***

Types of codes: block codes, Hamming and Lee metrics, description of linear block codes, parity check Codes, cyclic code, Masking techniques,

Unit-IV: Compression ***6 hours***

Compression: loss less and lossy, Huffman codes, LZW algorithm, Binary Image compression schemes, run length encoding, CCITT group 3 1- DCompression, CCITT group 3 2D compression, CCITT group 4 2DCompression.

Unit-V: Audio & Video Compression ***6 hours***

Convolutional codes, sequential decoding. Video image Compression: CITT H 261 Video coding algorithm, audio (speech) Compression. Cryptography and cipher.

Unit-VI: Case Study ***6 hours***

Case study of CCITT group 3 1-DCompression, CCITT group 3 2D compression.

Text/ Reference Books:

- Fundamentals in information theory and coding, Monica Borda,Springer.
- Communication Systems: Analog and digital, Singh and Sapre, TataMcGraw Hill.
- Multimedia Communications Fred Halsall.
- Information Theory, Coding and Cryptography R Bose.
- Multimedia system Design Prabhat K Andleigh and KiranThakrar.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE241 **Title of the Course:** Security Assessment and Risk Analysis
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Computer and Network Security

COURSE OUTCOMES

CO-1: Describe the concepts of risk management. (Cognitive Level :Understand)
CO-2: Define and differentiate various Contingency Planning components. (Cognitive Level :Create)
CO-3: Integrate the IRP, DRP, and BCP plans into a coherent strategy to support sustained organizational operations. (Cognitive Level :Analyze)
CO-4: Define and be able to discuss incident response options. (Cognitive Level :Apply)
CO-5: Design an Incident Response Plan for sustained organizational operations. (Cognitive Level :Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Security Overview ***8 hours***

Information Security (INFOSEC) Overview: critical information characteristics – availability information states – processing security countermeasureseducation, training and awareness, critical information characteristics – confidentiality critical information characteristics – integrity, information states – storage, information states – transmission, security countermeasurespolicy, procedures and practices, threats, vulnerabilities.

Unit -II: Threats & Vulnerabilities ***8 hours***

Threats to and Vulnerabilities of Systems: definition of terms (e.g., threats, vulnerabilities, risk), major categories of threats (e.g., fraud, Hostile Intelligence Service (HOIS), malicious logic, hackers, environmental and technological hazards, disgruntled employees, careless employees, HUMINT, and monitoring), threat impact areas, Countermeasures: assessments (e.g., surveys, inspections), Concepts of Risk Management: consequences (e.g., corrective action, risk assessment), cost/benefit analysis of controls, implementation of costeffective controls, monitoring the efficiency and effectiveness of controls (e.g., unauthorized or inadvertent disclosure of information), threat and vulnerability assessment

Unit -III: Security Planning ***6 hours***

Security Planning: directives and procedures for policy mechanism, Risk Management: acceptance of risk (accreditation), corrective actions information identification, risk analysis and/or vulnerability assessment components, risk analysis results evaluation, roles and responsibilities of all the players in the risk analysis process, Contingency Planning/Disaster Recovery: agency response procedures and continuity of operations, contingency plan components, determination of backup requirements, development of plans for recovery actions after a disruptive event, development of procedures for offsite processing, emergency destruction procedures, guidelines for determining critical and essential workload, team member responsibilities in responding to an emergency situation.

Unit -IV: Policies and Procedures ***6 hours***

Physical Security Measures: alarms, building construction, cabling, communications centre, environmental controls (humidity and air conditioning), filtered power, physical access control systems (key cards, locks and alarms) Personnel Security Practices and Procedures: access authorization/verification (needtoknow), contractors, employee clearances, position sensitivity, security training and awareness, systems maintenance personnel, Administrative Security Procedural Controls: attribution, copyright protection and licensing , Auditing and Monitoring: conducting security reviews, effectiveness of security programs, investigation of security breaches, privacy review of accountability controls, review of audit trails and logs

Unit-V: Operations Security ***6 hours***

Operations Security (OPSEC): OPSEC surveys/OPSEC planning INFOSEC: computer security – audit, cryptography encryption (e.g., point to point, network, link), cryptography key management (to include electronic key), cryptography strength (e.g., complexity, secrecy, characteristics of the key)

Unit -VI: Case Study ***6 hours***

Case study of threat and vulnerability assessment

Text/ Reference Books:

- Principles of Incident Response and Disaster Recovery, Whitman &Mattord, Course Technology ISBN: 141883663X
- (Web Link) http://www.cnss.gov/Assets/pdf/nstissi_4011.pdf

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE242 **Title of the Course:** Secure Coding
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Computer Programming, Compiler Design, Web programming

Course Outcomes

CO-1: Understand the basics of secure programming. (Cognitive Level :Understand)
CO-2: Understand the most frequent programming errors leading to software vulnerabilities. (Cognitive Level :Understand)
CO-3: Identify and analyze security problems in software. (Cognitive Level :Analyze)
CO-4: Understand and protect against security threats and software vulnerabilities. (Cognitive Level :Understand)
CO-5: Effectively apply their knowledge to the construction of secure software systems. (Cognitive Level :Remember)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	3					3	3	3	3	1
CO2	2	3	3	3	3			1		2	1	3	3	1
CO3	3	3	3	2	3			2	1	3	1	3	3	1
CO4	3	2	2	3	2	2				2	1	3	3	1
CO5	2	3	3	3	3		1			3	1	3	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I:Software Security ***8 hours***

Introduction to software security, Managing software security risk, Selecting software development technologies, An open source and closed source, Guiding principles for software

security, Auditing software, Buffet overflows, Access control, Race conditions, Input validation, Password authentication

Unit – II: Security Mechanism ***8 hours***

Anti-tampering, Protecting against denial of service attack, Copy protection schemes,Client-side security, Database security, Applied cryptography, Randomness and determinism

Unit – III: SQL Injection ***8 hours***

Buffer Overrun, Format String Problems, Integer Overflow, and Software Security Fundamentals SQL Injection, Command Injection, Failure to Handle Errors, and Security Touchpoints.

Unit – IV: Cross Site Scripting ***6 hours***

Cross Site Scripting, Magic URLs, Weak Passwords, Failing to Protect Data, Weak random numbers, improper use of cryptography

Unit – V: Information Leakage ***6 hours***

Information Leakage, Race Conditions, Poor usability, Failing to protect network traffic, improper use of PKI, trusting network name resolution

Unit – VI: Case Study ***6 hours***

Case study of Cross Site Scripting, Magic URLs, Weak Passwords Buffet overflows, Access control, Race conditions.

Text/ Reference Books:

- J. Viega, M. Messier. Secure Programming Cookbook, O'Reilly.
- M. Howard, D. LeBlanc. Writing Secure Code, Microsoft
- J. Viega, G. McGraw. Building Secure Software, Addison Wesley

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE243 **Title of the Course:** Biometrics
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Image Processing

COURSE OUTCOMES

CO-1: The objective of this course is to introduce Biometric and traditional authentication methods. (Cognitive Level :Understand)
CO-2: Application of bio-metric systems in government sector. (Cognitive Level :Apply)
CO-3: Various face recognition and finger print recognition methods are included. (Cognitive Level :Apply)
CO-4: Understand and protect against security threats and software vulnerabilities. (Cognitive Level :Understand)
CO-5: Effectively apply their knowledge to the construction of secure software systems. (Cognitive Level :Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Introduction to Biometric ***6 hours***
Introduction and Definitions of bio-metrics, Traditional authenticated methods and technologies.

Unit -II: Biometric Technologies ***6 hours***
Bio-metric technologies: Fingerprint, Face, Iris, Hand Geometry, Gait Recognition, Ear, Voice, Palm print, On-Line Signature Verification, 3D Face Recognition, Dental Identification and DNA.

Unit -III: Use of Biometric System ***8 hours***

The Law and the use of multi bio-metrics systems.

Unit -IV: Statistical Measurement of Biometric ***8 hours***

Statistical measurement of Bio-metric.Bio-metrics in Government Sector and Commercial Sector.

Unit -V: Case Studies ***6 hours***

Case Studies of bio-metric system, Bio-metric Transaction. Bio-metric System Vulnerabilities.

Unit -VI: Recent Trends ***6 hours***

Recent trends in Bio-metric technologies and applications in various domains. Case study of 3D face recognition and DNA matching.

Text/ Reference Books:

- Biometrics for network security, Paul Reid, Hand book of Pearson
- D. Maltoni, D. Maio, A. K. Jain, and S. Prabhakar, Handbook of Fingerprint Recognition, Springer Verlag, 2003.
- A. K. Jain, R. Bolle, S. Pankanti (Eds.), BIOMETRICS: Personal Identification in Networked Society, Kluwer Academic Publishers, 1999.
- J. Wayman, A.K. Jain, D. Maltoni, and D. Maio (Eds.), Biometric Systems: Technology, Design and Performance Evaluation, Springer, 2004.
- Anil Jain, Arun A. Ross, Karthik Nanda kumar, Introduction to biometric, Springer, 2011.
- Biometric Systems: Technology, Design and Performance Evaluation, J. Wayman, A.K. Jain, D. Maltoni, and D. Maio

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE351 **Title of the Course:** Data Warehousing and Mining
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Databases, Probability

Total Teaching Hours: 42 hours

COURSE OUTCOMES

CO-1: The objective of this course is to introduce data warehousing and mining techniques. (Cognitive Level :Understand)

CO-2: Application of data mining in web mining, pattern matching and cluster analysis is included to aware students of broad data mining areas. (Cognitive Level :Apply)

CO-3: Understand the role of business analytics within an organization. (Cognitive Level :Understand)

CO-4: To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making. (Cognitive Level :Understand)

CO-5: To become familiar with processes needed to develop, report, and analyze business data. (Cognitive Level :Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	3	1				3	3	3	3	1
CO2	2	3	3	3	3				1	2	1	3	3	1
CO3	3	3	3	2	3	2	1			3	1	3	3	1
CO4	3	3	3	3	3			2		2	1	3	3	1
CO5	2	3	3	3	3					3	1	3	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I: Introduction to Data Warehouse ***8 hours***

Introduction to Data Warehousing; Data Mining: Mining frequent patterns, association and correlations; Sequential Pattern Mining concepts, primitives, scalable methods;

Unit -II: Classification & Prediction ***8 hours***

Classification and prediction; Cluster Analysis – Types of Data in Cluster Analysis, Partitioning methods, Hierarchical Methods; Transactional Patterns and other temporal based frequent patterns,

Unit-III: Data Mining ***6 hours***

Mining Time series Data, Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time-series analysis;

Unit-IV: Mining Data Streams ***8 hours***

Mining Data Streams, Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data, Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem; Graph Mining; Social Network Analysis;

Unit -V: Web Mining ***6 hours***

Web Mining, Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining; Distributed Data Mining.

Unit-VI: Recent Trends ***6 hours***

Recent trends in Distributed Warehousing and Data Mining, Class Imbalance Problem; Graph Mining; Social Network Analysis

Text/ Reference Books:

- Jiawei Han and M Kamber , Data Mining Concepts and Techniques, , Second Edition, Elsevier Publication, 2011.
- Vipin Kumar, Introduction to Data Mining - Pang-Ning Tan, Michael Steinbach, Addison Wesley, 2006.
- G Dong and J Pei, Sequence Data Mining, Springer, 2007.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE352 **Title of the Course:** Web Search and Information Retrieval
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Probability Theory, Database Management, Web Programming

Total Teaching Hours: 40 hours

COURSE OUTCOMES

CO-1: The objective of the course is to introduce information retrieval models and query languages. (Cognitive Level :Understand)
CO-2: Application of web search and information retrieval in social networks is also included. (Cognitive Level :Apply)
CO-3: Understand the role of business analytics within an organization. (Cognitive Level :Understand)
CO-4: To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making. (Cognitive Level :Understand)
CO-5: To become familiar with processes needed to develop, report, and analyze business data. (Cognitive Level :Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Information Retrieval Model ***6 hours***
Information retrieval model, Information retrieval evaluation, Searching the Web

Unit -II: Document Presentation ***8 hours***
Document Representation, Query languages and query operation, Meta-data search,

Unit -III: Indexing & Searching ***6 hours***
Indexing and searching, Scoring and ranking feature vectors,

Unit -IV: Ontology ***8 hours***
Ontology, domain specific search, parallel and distributed information retrieval,

Unit -V: Social Network ***6 hours***

Text and multimedia languages, Social networks.

Unit -VI: Recent Trends ***6 hours***

Recent trends in Web search and Information retrieval techniques.

Text/ Reference Books:

- C. D. Manning, P. Raghavan and H. Schütze, Introduction to Information Retrieval, Cambridge University Press, 2008 (available at http://nlp.stanford.edu/IR-book).
- Chakrabarti, S. (2002). Mining the web: Mining the Web: Discovering knowledge from hypertext data. Morgan-kaufman.
- B. Croft, D. Metzler, T. Strohman, Search Engines: Information Retrieval in Practice, AddisonWesley, 2009 (available at http://ciir.cs.umass.edu/irbook/).
- R. Baeza-Yates, B. Ribeiro-Neto, Modern Information Retrieval, Addison-Wesley, 2011 (2nd Edition).

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISPE353 **Title of the Course:** Data Security and Access Control
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Database Management

Total Teaching Hours: 42 hours

COURSE OUTCOMES

CO-1: The objective of the course is to provide fundamentals of database security. (Cognitive Level :Understand)

CO-2: Various access control techniques mechanisms were introduced along with application areas of access control techniques. (Cognitive Level :Apply)

CO-3: Describe the concepts of risk management. (Cognitive Level :Analyze)

CO-4: Define and be able to discuss incident response options. (Cognitive Level :Apply)

CO-5: Design an Incident Response Plan for sustained organizational operations. (Cognitive Level :Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	3	-	-	-	-	3	3	3	3	1
CO2	2	3	3	3	3	-	-	-	-	2	1	3	3	1
CO3	3	3	3	2	3	-	-	-	-	3	1	3	3	1
CO4	3	3	3	3	3	-	-	-	-	2	1	3	3	1
CO5	2	3	3	3	3	-	-	-	-	3	1	3	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I: Introduction to Access Control ***6 hours***
Introduction to Access Control, Purpose and fundamentals of access control, brief history,

Unit -II: Access Control Policies ***8 hours***

Policies of Access Control, Models of Access Control, and Mechanisms, Discretionary Access Control (DAC), Non- Discretionary Access Control , Mandatory Access Control (MAC). Capabilities and Limitations of Access Control Mechanisms: Access Control List (ACL) and Limitations, Capability List and Limitations,

Unit -III: Role Based Access Control ***8 hours***

Role-Based Access Control (RBAC) and Limitations, Core RBAC, Hierarchical RBAC, Statically Constrained RBAC, Dynamically Constrained RBAC, Limitations of RBAC. Comparing RBAC to DAC and MAC Access control policy,

Unit -IV: Integrity Model ***8 hours***

Biba'sintrigity model, Clark-Wilson model, Domain type enforcement model , mapping the enterprise view to the system view, Role hierarchies- inheritance schemes, hierarchy structures and inheritance forms, using SoD in real system, Temporal Constraints in RBAC, MAC AND DAC. Integrating RBAC with enterprise IT infrastructures: RBAC for WFMSs, RBAC for UNIX and JAVA environments Case study: Multi line Insurance Company.

Unit -V: Smart Card Based Information Security ***6 hours***

Smart Card based Information Security, Smart card operating systemfundamentals, design and implantation principles, memory organization, smart card files, file management, atomic operation, smart card data transmission ATR,PPS Security techniques- user identification , smart card security, quality assurance and testing , smart card life cycle-5 phases, smart card terminals.

Unit -VI: Recent Trends ***6 hours***

Recent trends in Database security and access control mechanisms. Case study of Role-Based Access Control (RBAC) systems.

Text/ Reference Books:

- Role Based Access Control: David F. Ferraiolo, D. Richard Kuhn, RamaswamyChandramouli.
- http://www.smartcard.co.uk/tutorials/sct-itsc.pdf : Smart Card Tutorial.

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

OPEN ELECTIVES

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISOE311 **Title of the Course:** Business Analytics
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Optimization, Data mining
Total Teaching Hours: 40 hours

After completing this Course (or unit of a course) the students should be able to:
CO1: Appraise the scope and process of Business Analytics. (Cognitive Level :Understand)
CO2: Interpret Trendlines and Regression. (Cognitive Level :Understand)
CO3: Compare linear and non-linear optimization. (Cognitive Level :Evaluate)
CO4: Assess the different forecasting models. (Cognitive Level :Analyze)
CO5: Formulate decision problems and decision strategies. (Cognitive Level :Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	1	1	2			1			1	1	
CO2	1	2		2	2	3		2	2	1	1	2
CO3	1	2		2			3	2	2	1	1	
CO4	1	2	1	2	1	1			1		1	1
CO5	1	3		2				2			1	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I: Business Analytics ***6 hours***

Business analytics: 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 – II: Trendiness & Regression Analysis ***8 hours***

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytic Technology.

Unit – III: Business Analytics ***8 hours***

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Unit – IV: Forecasting Techniques ***6 hours***

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

Unit – V: Decision Analysis ***6 hours***

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.

Unit – VI: Recent Trends ***6 hours***

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Text/ Reference Books:

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

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISOE312 **Title of the Course:** Block Chain Design and Their Use Cases
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Data Structure, Compiler Design, Theory of Computation

COURSE OUTCOMES

CO-1: To impart knowledge on different facets and aspects of engineering systems safety, focusing on tools, techniques and methodologies. (Cognitive Level :Understand)
CO-2: Capable to identifying problems on which blockchains could be applied. (Cognitive Level :Apply)
CO-3: Introduce the concept and the basics of blockchain technologies. (Cognitive Level :Understand)
CO-4: Enable awareness on the different generations of blockchains. (Cognitive Level :Analyze)
CO-5: Provide knowledge on various applications of blockchain technologies. (Cognitive Level :Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	3	1	1	2	1		2		2	2	2
CO3	2	3	2	2		2	1	3	1	1	2	2
CO4	3	2	2	2	1	2			2	3	3	1
CO5	1	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unitwise Syllabus

Unit – I: Introduction ***8 hours***
Blockchain history, basics, architectures, Types of blockchain, Base technologies – Dockers, Hash function, Digital Signature - ECDSA, Zero Knowledge Proof.

Unit – II: Bitcoins ***8 hours***
Fundamentals, aspects of bitcoins, properties of bitcoins, bitcoin transactions, bitcoin

Unit – III: P2P networks ***8 hours***
Block generation at bitcoins, consensus algorithms- Proof of Work, Proof of Stake, Proof of Burn.

Unit – IV: Blockchain hyperledger ***8 hours***

Fabric architecture, implementation, networking, fabric transactions, demonstration, smart contracts.

Unit – V: Applications ***8 hours***

Blockchain applications, e-governance, smart cities, smart industries, anomaly detections, use cases, trends on Blockchains, serverless blocks, scalability issues, blockchain on clouds.

Text/ Reference Books:

- Baxv Kevin Werbach, The Blockchain and the new architecture of Trust, MIT Press, 2018
- Joseph J. Bambara and Paul R. Allen, Blockchain – A practical guide to developing business, law, and technology solutions, McGraw Hill, 2018.
- Joseph J. Bambara and Paul R. Allen, Blockchain, IoT, and AI: Using the power of three to develop business, technical, and legal solutions, Barnes & Noble publishers, 2018.
- Melanie Swan, Blockchain – Blueprint for a new economy, OReilly publishers, 2018. Page 19 of 23
- Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Blockchain for Business, Pearson publishers, 2019.
- Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISOE313 **Title of the Course:** Operation Research
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: NIL
Total Teaching Hours: 40 hours

COURSE OUTCOMES

At the end of the course, the student should be able to
CO-1: Students should able to apply the dynamic programming. (Cognitive Level :Apply)
CO-2: Problems of discreet and continuous variables. (Cognitive Level :Understand)
CO-3: Students should able to apply the concept of non-linear programming. (Cognitive Level :Apply)
CO-4: Students should able to carry out sensitivity analysis. (Cognitive Level :Analyze)
CO-5: Student should able to model the real world problem and simulate it. (Cognitive Level :Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Optimization Techniques ***6 hours***
Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit – II: Formulation of LPP ***8 hours***
Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Unit – III: Nonlinear Programming Problem ***8 hours***
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit – IV: Scheduling & Sequencing ***6 hours***

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit – V: Competitive Models ***6 hours***

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation.

Unit – VI: Transportation Problem ***6 hours***

Introduction, Formulation of Transportation Problem (TP), Transportation Algorithm (MODI Method), the Initial Basic Feasible Solution, Moving Towards Optimality.

Text/ Reference Books:

- H.A. Taha, Operations Research, An Introduction, PHI, 2008
- H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
- J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
- Hitler Libermann Operations Research: McGraw Hill Pub. 2009
- Pannerselvam, Operations Research: Prentice Hall of India 2010
- Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Teaching-Learning Strategies in brief (4 to 5 sentences)

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2. Learning through Case Studies
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4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISOE314 **Title of the Course:** Cost Management of Engineering Projects
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: NIL
Total Teaching Hours: 40 hours

COURSE OUTCOMES

CO-1: Identify and use the tools and techniques of project management. (Cognitive Level :Remember)
CO-2: Effectively use project reporting tools and techniques. (Cognitive Level :Analyze)
CO-3: Understand the importance of risk, cost, schedule and resource control and management of a project. (Cognitive Level :Understand)
CO-4: Understand the need for effective project management skills, training and the specific training needs of project managers. (Cognitive Level :Understand)
CO-5: Demonstrate an understanding of the role of Project Management vs. Functional Management. Write clear goal and objective statements and establish measurable criteria for project success. (Cognitive Level :Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	3	3	3	3	2	1	1	3	3	3
CO2	3	3	3	3	3	3	2	1	1	3	2	1
CO3	3	3	3	3	3	3	2	1	1	3	2	2
CO4	3	3	3	3	3	3	2	1	1	3	1	2
CO5	3	3	3	3	3	3	2	1	1	3	3	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit-I ***6 hours***

Introduction and Overview of the Strategic Cost Management Process, Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit-II ***6 hours***

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of

technical and non technical activities. Detailed Engineering activities. Pre project execution main clearances and documents.

Unit-III ***6 hours***

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 ***8 hours***

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis.

Unit-V ***8 hours***

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-VI ***6 hours***

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Text/ Reference Books:

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

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
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3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISOE315 **Title of the Course:** IoT Fundamentals and Architecture
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Computer Architecture

COURSE OUTCOMES

CO1: Identify the IoT networking components with respect to OSI layer. (Cognitive Level :Understand)
CO2: Build schematic for IoT solutions. (Cognitive Level :Create)
CO3: Design and develop IoT based sensor systems. (Cognitive Level :Analyze)
CO4: Select IoT protocols and software. (Cognitive Level :Create)
CO5: Evaluate the wireless technologies for IoT. (Cognitive Level :Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	3	1	1	2	1		2		2	2	2
CO3	2	3	2	2		2	1	3	1	1	2	2
CO4	3	2	2	2	1	2			2	3	3	1
CO5	1	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Evolution of IoT ***8 hours***
Review of computer communication concepts (OSI layers, components, packet communication, Networks, TCP-IP, subnetting,IPV4 addressing and challenges). IPV6 addressing. IoT architecture reference layer.

Unit 2: Introduction to IoT components ***8 hours***
Characteristics IoT sensor nodes, Edge computer, cloud and peripheral cloud, single board computers, open source hardwares, Examples of IoT infrastructure

Unit 3: IoT protocols and softwares ***8 hours***
MQTT, UDP, MQTT brokers, publish subscribe modes, HTTP, COAP,XMPP and gateway protocols,

Unit 4: IoT point to point communication technologies ***6 hours***
IoT Communication Pattern, IoT protocol Architecture, Selection of Wireless technologies (6LoWPAN, Zigbee, WIFI, BT, BLE, SIG, NFC, LORA, Lifi, Widi)

Unit 5: Introduction to Cloud computation and Big data analytics ***6 hours***

Evolution of Cloud Computation, Commercial clouds and their features, open source IoT platforms, cloud dashboards, Introduction to big data analytics and Hadoop.

Unit 6: IoT security, IoT application and its Variants ***10 hours***

Need for encryption, standard encryption protocol, light weight cryptography, Quadruple Trust Model for IoT-A – Threat Analysis and model for IoT-A, Cloud security
Case studies: IoT for smart cities, health care, agriculture, smart meters.M2M, Web of things, Cellular IoT, Industrial IoT, Industry 4.0, IoT standards.

Reference Books:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
5. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1 st Edition, VPT, 2014.
6. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISOE316 **Title of the Course:** Numerical Methods
L-T-P: 3-1-0 CREDIT:4
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Basics of Statistics
Total Teaching Hours: 44 hours

COURSE OUTCOMES

CO1: Solve first and second order ordinary differential equation arising in flow problems using single step numerical methods. (Cognitive Level :Analyze)
CO2: Determine the externals of functional and solve the simple problems of the Calculus of variations. (Cognitive Level :Understand)
CO3: Solve the mathematical formulation of linear programming problem. (Cognitive Level :Analyze)
CO4: Solve the applications of transport problems and theory of games. (Cognitive Level :Analyze)
CO5: Fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data. (Cognitive Level :Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2			1				1	1	
CO2	3	3	3	1	2		1		2		1		1	1
CO3	2	3	2	1	2					1	1		1	
CO4	3	2	3	2	2	1							1	1
CO5	3	3	2	1									1	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit I: Errors in Numerical Methods ***10 hours***

Approximate numbers and Significant figures; Rouding-off numbers; Errors: Absolute, Relative and Percentage; Error in Arithmetical operations; A General Error Formula; Errors in Numerical Computations; Inverse Problems.

Solution of equations in one variable

Bisection method; Iteration method; Regula-Falsi method; Convergence of Regula-Falsi method; Secant method; Newton-Raphson method; Generalised Method for multiple roots; Rate of Convergence of Newton's square root formula; Newton's Inverse formula; Graffe's Root-Squaring method; Ramanujan's method; Rate of Convergence and. Computer Programmes for the above methods;

Unit 2: Numerical solution of system of equations ***8 hours***

Gauss elimination method; Gauss-Jordan method; Jacobi's iteration method; Gauss Sidel method; Error analysis; Computer programs based for the above methods.

Operators and Difference Equations

Forward difference operator, Backward difference operator, Shift operator, Average operator, Central difference operator and their relations; Factorial Notation; Synthetic division; Missing Term Technique; Basic ideas of Difference Equations.

Unit III: Interpolation ***10 hours***

Newton's forward interpolation formula; Newton's backward interpolation formula; Stirling's Formula; Bessel formula; Lagrange's interpolation formula; Divided differences; Newton's divided difference formula; Numerical differentiation and applications; Central Difference Interpolation Formulae; Gauss' Forward central Difference Formula; Gauss' Backward central Difference Formula; Computer Programs for the above formulas.

Unit IV: Numerical integration ***8 hours***

A general quadrature formula for equidistant nodes; Trapezoidal rule; Simpson's one-third rule, Simpson's three-eight rule; Wedddle's rule; Inherent errors in numerical integrations; Newton-Cotes quadrature formula; Euler-Maclaurin formula; Gaussian quadrature formula; Flow charts, Algorithms and Computer Programs to implement the above techniques.

Unit V: Numerical Methods ***8 hours***

Numerical Methods of Solution of O.D.E, Picard's Method of Successive Approximations; Picard's Method for Simultaneous First Order Differential Equations; Euler's Method;; Modified Euler's Method; Runge-Kutta method; Flow-charts, algorithms and computer programs for the above methods.

Reference Books:

1. B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 43rd Edition, 2013.
2. S. D. Sharma, "Operations Research", Kedar Nath and Ram Nath Publishers, Seventh Revised Edition 2014.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley-India publishers, 10th edition, 2014.
4. Ramana B. V., "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006.
5. Bali N. P. & Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, 8th Edition

Teaching-Learning Strategies in brief

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2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

AUDIT COURSE

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISAC111 **Title of the Course:** English for Research Paper Writing
L-T-P: 2-0-0 Credit:-0
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: Basics of English Language

COURSE OUTCOMES

After completing this Course (or unit of a course) the students should be able to:
CO1: Appraise the different aspects of Planning and Preparation involved in writing research papers. (Cognitive Level :Understand)
CO2: Interpret and highlight the key findings. (Cognitive Level :Remember)
CO3: Compare and describe various sections of a research paper. (Cognitive Level :Understand)
CO4: Assess the skills needed to write various sections of a research paper. (Cognitive Level :Create)
CO5: Evaluate the usefulness of different types of phrases in the context of research paper writing. (Cognitive Level :Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1		1			2	1	3	1	3	1		1
CO2	1			2		1	3	2	3		2	2
CO3			1		1		3		3	2		
CO4			2				3	1	3		1	
CO5							3		3			

Unit wise Syllabus

Unit – I: Planning and Preparation ***5 hours***
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit – II: Plagiarism ***5 hours***
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit – III: Review Study ***5 hours***
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit – IV: Writing Skill ***5 hours***

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

Unit – V: Writing Skill-II ***5 hours***

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

Unit – VI: Quality Assurance ***5 hours***

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

Text/ Reference Books:

- Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
- Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
- Goel S. L., Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISAC112 **Title of the Course:** Disaster Management
L-T-P: 2-0-0 Credit:-0
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: None
Total Teaching Hours: 30 hours

COURSE OUTCOMES

Students will be able to:
CO-1: Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response. (Cognitive Level :Understand)
CO-2: Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. (Cognitive Level :Evaluate)
CO-3: Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations. (Cognitive Level :Understand)
CO-4: Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries. (Cognitive Level :Understand)
CO-5: Critically understand the strengths and weaknesses of disaster management in their home country or the countries they work in. (Cognitive Level :Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	3	1	1	2	1		2		2	2	2
CO3	2	3	2	2		2	1	3	1	1	2	2
CO4	3	2	2	2	1	2			2	3	3	1
CO5	1	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Introduction ***5 hours***
Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

Unit – II: Repercussions of Disasters and Hazards ***5 hours***
Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Unit – III: Disaster Prone Areas In India ***5 hours***

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post Disaster Diseases And Epidemics

Unit – IV: Disaster Preparedness And Management ***5 hours***

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit – V: Risk Assessment ***5 hours***

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Unit – VI: Disaster Mitigation ***5 hours***

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

Text/ Reference Books:

- R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
- Sahni, Pardeep Et.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
- Goel S. L., Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi.

Teaching-Learning Strategies in brief (4 to 5 sentences)

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5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISAC113 **Title of the Course:** Pedagogy Studies
L-T-P: 2-0-0 Credit:-0
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: None
Total Teaching Hours: 30 hours

COURSE OUTCOMES

CO-1: The course imparts knowledge of pedagogical practices being used by teachers in formal and informal classrooms. (Cognitive Level :Understand)
CO-2: Evidence on the effectiveness of pedagogical practices. (Cognitive Level :Remember)
CO-3: Identify critical evidence gaps to guide the development. (Cognitive Level :Understand)
CO-4: Appraise the different aspects of Planning and Preparation involved in writing research papers. (Cognitive Level :Create)
CO-5: Interpret and highlight the key findings. (Cognitive Level :Understand)

Unit wise Syllabus

Unit – I: Introduction and Methodology ***5 hours***
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 ***5 hours***
Thematic overview: Pedagogical practices are being used by teachers informal and informal classrooms in developing countries.Curriculum, Teacher education.

Unit – III: Pedagogical Practices ***6 hours***
Evidence on the effectiveness of pedagogical practices 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 ***8 hours***
Professional development: 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: Future Directions ***6 hours***
Research gaps and future directions, Research design, Contexts, Pedagogy,
Teacher education, Curriculum and assessment, Dissemination and research impact.

Text/ Reference Books:

- Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2):245-261.
- Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
- Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
- Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basi maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
- Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education.
- Oxford and Boston: Blackwell.
- Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
- www.pratham.org/images/resource%20working%20paper%202.pdf.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning through discussion among the peer group
2. Learning through Case Studies
3. Open ended questions by teacher
4. Open ended questions from students
5. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations;
2. closed-book and open-book tests;
3. individual project reports(case-study reports)
4. viva voce interviews
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISAC221 **Title of the Course:** Constitution of India
L-T-P: 2-0-0
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: None
Total Teaching Hours: 30 hours

COURSE OUTCOMES

After completing this Course, the students should be able to …….

CO1. To give overview of Development of constitution of India. (Cognitive Level :Understand)
CO2. To Explain Schedule and sources of constitution of India. (Cognitive Level :Understand)
CO3. To discuss Citizenship Act, 1955. (Cognitive Level :Understand)
CO4. To highlight the Fundamental Rights. (Cognitive Level :Understand)
CO5. To make aware of Amendment of constitution. (Cognitive Level :Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	2	1	3							2	3
CO2	3	2	2		2			2	2	3	2	3
CO3			2	3	2	1					3	
CO4					2		1		2	2	2	
CO5			2		3	2		2	2	3	3	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit wise Syllabus

Unit – I: History of Making of the Indian Constitution ***5 hours***
History, Drafting Committee, (Composition & Working)

Unit – II: Philosophy of the Indian Constitution ***5 hours***
Preamble, Salient Features

Unit – III: Contours of Constitutional Rights & Duties ***5 hours***
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, Fundamental Duties.

Unit – IV: Organs of Governance ***5 hours***

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 – V: Local Administration ***5 hours***

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

Unit – VI: Election Commission ***5 hours***

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.

Text/ Reference Books:

- The Constitution of India, 1950 (Bare Act), Government Publication.
- 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.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISAC222 **Title of the Course:** Value Education
L-T-P: 2-0-0 Credit:0
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: NIL
Total Teaching Hours: 30 hours

COURSE OUTCOMES

Course Outcomes: The course will be able to
CO-1: Help student understand value of education and self- development. (Cognitive Level :Understand)
CO-2: Imbibe good values in students. (Cognitive Level :Understand)
CO-3: Help students know about the importance of character. (Cognitive Level :Understand)
CO-4: To give students a deeper understanding about the purpose of life. (Cognitive Level :Understand)
CO-5: To teach and inculcate the essential qualities to become a good leader. (Cognitive Level :Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit – I: Value & Self Development ***5 hours***
Values and self-development – Social values and individual attitudes. Work ethics, Indian vision of humanism, Moral and non- moral valuation. Standards and principles.
Value judgements

Unit – II: Cultivation of Values ***5 hours***
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 – III: Personality & Behaviour Development ***5 hours***

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

Unit – IV: Character & Competence ***5 hours***

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

Unit – V: Value Education towards National and Global Development ***5 hours***

Constitutional Values: Sovereign, Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom, Fraternity, Social Values: Pity and Probity, Self-Control, Universal Brotherhood. Professional Values: Knowledge Thirst, Sincerity in Profession, Regularity, Punctuality, Faith.

Unit – VI: Religious, Moral Values, and Aesthetic Values: ***5 hours***

Tolerance, Wisdom, character. Love and Appreciation of literature, fine arts and respect for the same.

Text/ Reference Books:

- Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. **Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.**

Name of the Academic Program: M.Tech. (CSE-CFIS)
Course Code: MTCFISAC223 **Title of the Course:** Personality Development through Life Enlightenment Skills
L-T-P: 2-0-0 **Credit:-0**
(L = Lecture hours, T = Tutorial hours, P = Practical hours)
Course Prerequisite: None
Total Teaching Hours: 30 hours

COURSE OUTCOMES

CO-1: To learn to achieve the highest goal happily. (Cognitive Level :Understand)
CO-2: To become a person with stable mind, pleasing personality and determination. (Cognitive Level :Understand)
CO-3: To awaken wisdom in students. (Cognitive Level :Remember)
CO-4: The course aims to cause a basic awareness about the significance of soft skills in professional and inter-personal communications. (Cognitive Level :Understand)
CO-5: It helps understand personality traits and formation and vital contribution in the world of business. (Cognitive Level :Remember)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	2	1		3		1		1	3	3
CO2	3	2	1	1	2	2		2		1	2	2
CO3	2	3	2	2		2	1		1	1	2	2
CO4	3	2	1	2		2			2	3	3	3
CO5	3	2	1	2		3		2		1	3	3

3-High Level, 2-Medium Level, 1-Low Level

Unit wise Syllabus

Unit-I: Introduction to Personality Development ***5 hours***

The concept of personality - Dimensions of personality – Theories of Freud & Erickson- Significance of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analysis.

Unit-II: Attitude ***5 hours***

Motivation Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude – Advantages –Negative attitude- Disadvantages - Ways to develop positive attitude - Differences

between personalities having positive and negative attitude. Concept of motivation - Significance – Internal and external motives - Importance of self- motivation- Factors leading to de-motivation.

Unit-III: Stages of development ***5 hours***

Freudian stages of development, Erik Erickson's stages of development. Maslow's hierarchy of needs.

Unit – IV: Neetisatakam ***5 hours***

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 – V: Approach to day to day work and duties ***5 hours***

Approach to day to day work and duties, Shrimad Bhagwad Geeta : 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 – VI: Statements of basic knowledge ***5 hours***

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

Text/ Reference Books:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi
2. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication
3. Department), Kolkata
4. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath,
5. Rashtriya Sanskrit Sansthanam, New Delhi.

Teaching-Learning Strategies in brief

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Assessment methods and weightages in brief

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