CURRICULUM

(Scheme of Studies and Examinations and Syllabus for 03rd-08th sem.)

('C' Scheme)

for

UNDERGRADUATE DEGREE

(B. Tech.) COURSE

IN

COMPUTER SCIENCE

&

ENGINEERING

[w.e.f. 2019-20]

FACULTY OF INFORMATION TECHNOLOGY AND COMPUTER SCIENCE
DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE AND TECHONOLOGY
(Established Under Haryana Legislature Act No. 29 of 2006)
Murthal-131039, Sonipat (Haryana)
www.dcrust.ac.in

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 2nd YEAR (SEMESTER –III) COMPUTER SCIENCE AND ENGINEERING
Choice Based Credit System Scheme of Studies & Examinations w.e.f. 2019-20

Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			
1	CSE201C	Data Structures & Algorithms	3	0	0	25	75	0	100	3	3
2	CSE203C	Computer Organization & Architecture	3	0	0	25	75	0	100	3	3
3	ECE203C	Digital System Design	3	0	0	25	75	0	100	3	3
4	MATH307C	Mathematics-III (PDE&T)	3	0	0	25	75	0	100	3	3
5	MGT201C	Engineering Economics	3	0	0	25	75	0	100	3	3
6	CSE205C	IT Workshop	1	0	4	25	0	75	100	3	3
7	CSE281C	Data Structures & Algorithms Lab	0	0	4	25	0	75	100	2	3
8	ECE283C	D S D lab	0	0	2	25	0	75	100	1	3
9	MC203C OR MC201C	Constitution of India (Gr-A)/ Environment Science (Gr-B)	3	0	0	25	75	0	100	0	3
Total			**19**	**0**	**10**	**225**	**450**	**225**	**900**	**21**	**27**

L = Lecture, T = Tutorial, P = Practical

NOTE:
1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculators will not be permitted in the examinations
2. Environmental Studies (MC201C)/ Constitution of India (MC203C) are mandatory & qualifying courses.
3. For DCRUST Murthal: GROUP A: BME, BT, CSE, ECE. GROUP B: CE, CHE, EE, ME.

B. Tech. 3rd semester to 8th semester CSE: Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2018-19 & onwards and trailing students.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 2nd YEAR (SEMESTER –IV) COMPUTER SCIENCE AND ENGINEERING
Choice Based Credit System Scheme of Studies & Examinations w.e.f. 2019-20

Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			
1.	CSE202C	Web & Internet Technologies	3	0	0	25	75	0	100	3	3
2.	CSE204C	Operating Systems	3	0	0	25	75	0	100	3	3
3.	CSE206C	Design & Analysis of Algorithms	3	0	0	25	75	0	100	3	3
4.	CSE208C	Discrete Mathematics	3	0	0	25	75	0	100	3	3
5.	MGT202C	Organizational Behaviour	3	0	0	25	75	0	100	3	3
6.	CSE282C	Web & Internet Technologies Lab	0	0	4	25	0	75	100	2	3
7.	CSE284C	Operating Systems Lab	0	0	4	25	0	75	100	2	3
8.	CSE286C	Design & Analysis of Algorithms Lab	0	0	4	25	0	75	100	2	3
9.	MC203C OR MC201C	Constitution of India (Gr-A) / Environment Science (Gr-B)	3	0	0	25	75	0	100	0	3
Total			**18**	**0**	**12**	**225**	**450**	**225**	**900**	**21**	**27**

NOTE:

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculators will not be permitted in the examinations
2. Environmental Studies (MC201C)/ Constitution of India (MC203C) are mandatory & qualifying courses.
3. For DCRUST Murthal: GROUP A: BME, BT, CSE, ECE. GROUP B: CE, CHE, EE, ME.
4. Each students has to undergo Professional Training of at least 4 weeks from the industry, institute, research lab, training centre etc. during summer vacation and its evaluation shall be carried out in the V semester.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 3rd YEAR (SEMESTER –V) COMPUTER SCIENCE AND ENGINEERING
Choice Based Credit System Scheme of Studies & Examinations w.e.f. 2020-21

Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			
1.	CSE301C	Object Oriented Programming	3	0	0	25	75	0	100	3	3
2.	CSE303C	Database Management Systems	3	0	0	25	75	0	100	3	3
3.	CSE305C	Computer Networks	3	0	0	25	75	0	100	3	3
4.	CSE307C	Formal Languages & Automata Theory	3	0	0	25	75	0	100	3	3
5.	CSE309C	Software Engineering	3	0	0	25	75	0	100	3	3
6.	PEC-I	Program Elective-I	3	0	0	25	75	0	100	3	3
7.	CSE381C	Object Oriented Programming Lab	0	0	4	25	0	75	100	2	3
8.	CSE383C	Database Management Systems Lab	0	0	4	25	0	75	100	2	3
9.	CSE385C	Professional Training (Level-2) Seminar	0	0	2	50	0	0	50	2	-
Total			**18**	**00**	**10**	**250**	**450**	**150**	**850**	**24**	**24**

For B.Tech (Hons) degree the students will study the following subjects in addition to the subjects mentioned above.

SEMESTER-V											
Sl. No.	**Course Code**	**Course Title**	**Teaching Schedule**			**Marks of Class work**	**Examination Marks**		**Total**	**Credits**	**Duration of Exam**
			L	**T**	**P**		**Theory**	**Practical**			
B.Tech. (Hons.) in CSE with specialization in Blockchain (H1)											
1.	CSEH301C	Network Security and Cryptography	3	0	0	25	75	0	100	3	3
2.	CSEH381C	Network Security and Cryptography Lab	0	0	4	25	0	75	100	2	3
B.Tech. (Hons.) in CSE with specialization in Cyber Security (H2)											
1.	CSEH301C	Network Security and Cryptography	3	0	0	25	75	0	100	3	3
2.	CSEH381C	Network Security and Cryptography Lab	0	0	4	25	0	75	100	2	3
B.Tech. (Hons.) in CSE with specialization in Data Science (H3)											
1.	CSEH303C	Introduction to Data Science	3	0	0	25	75	0	100	3	3
2.	CSEH383C	Python for Data Science Lab	0	0	4	25	0	75	100	2	3
Total(H1/H2/H3)			**3**	**0**	**4**	**50**	**75**	**75**	**200**	**5**	**6**

B. Tech. 3rd semester to 8th semester CSE: Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2018-19 & onwards and trailing students.

Program Elective-I

Course Code	Course Title	Course Code	Course Title
CSE321C	Computer Graphics	CSEH301C	Network security and Cryptography[1,2]
CSE323C	Programming Languages	CSEH303C	Introduction to Data Science[3]
CSE325C	Wireless Communication		

[1]Not to be opted by B.Tech (Hons) students opting specialization in Blockchain.
[2]Not to be opted by B.Tech(Hons) students opting specialization in Cyber Security
[3]Not to be opted by B.Tech(Hons) students opting specialization in Data Sciences

NOTE:

1. Assessment of Professional Training (Level-2)(CSE385C), undergone at the end of semester-IV, will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from the industry / institute / research lab / training centre etc.
2. Students will be permitted to opt for any one elective from the list of Program Elective-1. The minimum strength of the students should be 20 to run an elective course.
3. The student pursuing B.Tech (Hons.) will choose any one out of three specializations (Blockchain (H1), Cyber security (H2) and Data Science (H3) in this semester. The specialization once chosen will remain same for next subsequent semesters.
4. The students pursuing B.Tech (Hons.) can choose any subject from the list of Program Elective –I except the one from the selected specialization (Blockchain (H1), Cyber security (H2) and Data Science (H3))..
5. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculators will not be permitted in the examinations.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 3rd YEAR (SEMESTER –VI) COMPUTER SCIENCE AND ENGINEERING
Choice Based Credit System Scheme of Studies & Examinations w.e.f. 2020-21

Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			
1.	CSE302C	Compiler Design	3	0	0	25	75	0	100	3	3
2.	PEC-II	Program Elective-II	3	0	0	25	75	0	100	3	3
3.	PEC-III	Program Elective-III	3	0	0	25	75	0	100	3	3
4.	OEC-I	Open Elective-I	3	0	0	25	75	0	100	3	3
5.	OEC-II	Open Elective-II (Humanities)	3	0	0	25	75	0	100	3	3
6.	CSE382C	Compiler Design Lab	0	0	4	25	0	75	100	2	3
7.	PEC-II Lab	Program Elective-II Lab	0	0	4	25	0	75	100	2	3
Total			**15**	**0**	**8**	**175**	**375**	**150**	**700**	**19**	**21**

For B.Tech (Hons) degree the students will study the following subjects in addition to the subjects mentioned above.

SEMESTER-VI											
Sl. No.	**Course Code**	**Course Title**	**Teaching Schedule**			**Marks of Class work**	**Examination Marks**		**Total**	**Credits**	**Duration of Exam**
			L	**T**	**P**		**Theory**	**Practical**			
B.Tech. (Hons.) in CSE with specialization in Blockchain (H1)											
1.	CSEH302C	Cryptocurrency with Ethereum	3	0	0	25	75	0	100	3	3
2.	CSEH382C	Cryptocurrency with Ethereum Lab	0	0	4	25	0	75	100	2	3
3.	CSEH304C	Foundations of Blockchain Technology	3	0	0	25	75	0	100	3	3
B.Tech. (Hons.) in CSE with specialization in Cyber Security (H2)											
1.	CSEH306C	Information Security and Data Hiding	3	0	0	25	75	0	100	3	3
2.	CSEH386C	Information Security and Data Hiding Lab	0	0	4	25	0	75	100	2	3
3.	CSEH308C	Mobile and Smart Forensics	3	0	0	25	75	0	100	3	3
B.Tech. (Hons.) in CSE with specialization in Data Science (H3)											
1.	CSEH310C	Data Analytics with Python	3	0	0	25	75	0	100	3	3
2.	CSEH390C	Data Analytics with Python Lab	0	0	4	25	0	75	100	2	3
3.	CSEH312C	Data Mining	3	0	0	25	75	0	100	3	3
Total(H1/H2/H3)			**6**	**0**	**4**	**75**	**150**	**75**	**300**	**8**	**9**

B. Tech. 3rd semester to 8th semester CSE: Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2018-19 & onwards and trailing students.

Program Elective-II

Course Code	Course Title	Course Code	Course Title
CSE324C	Mobile Applications Development	CSE330C	IoT Architecture & Protocols [4]
CSE326C	Digital Image Processing	CSEH306C	Information Security and Data Hiding[2]
CSE328C	Advanced Java	CSEH310C	Data Analytics with Python[3]

Program Elective-II Lab

Course Code	Course Title	Course Code	Course Title
CSE384C	Mobile Applications Development Lab	CSE390C	IoT Architecture & Protocols Lab
CSE386C	Digital Image Processing Lab	CSEH386C	Information Security and Data Hiding Lab[2]
CSE388C	Advanced Java Lab	CSEH390C	Data Analytics with Python Lab[3]

Program Elective-III

Course Code	Course Title	Course Code	Course Title
CSE340C	Artificial Intelligence and Expert System	CSEH304C	Foundations of Blockchain Technology[1]
CSE342C	Advanced Computer Networks	CSEH312C	Data Mining[3]
CSE344C	Software Testing		

[1]Not to be opted by B.Tech (Hons) students opting specialization in Blockchain.
[2]Not to be opted by B.Tech(Hons) students opting specialization in Cyber Security
[3]Not to be opted by B.Tech(Hons) students opting specialization in Data Sciences
[4]Not to be opted by B.Tech(Hons) students opting specialization in IoT

NOTE:

1. Students will be permitted to opt for any one elective each from the list of Program Elective-II and Program Elective-III. The minimum strength of the students should be 20 to run an elective course.
2. The student pursuing B.Tech (Hons.) will choose subjects as per the specialization opted in the V semester.
3. The students pursuing B.Tech (Hons.) can choose one subject each from the list of Program Elective –II and Program Elective –III except already opted as per the specialization (Blockchain (H1), Cyber security (H2) and Data Science (H3)). The students should choose different subjects.
4. Each student has to undergo Professional Training (Level-3) of at least 4 weeks from the industry, institute, research lab, training centre etc. during summer vacation and its evaluation shall be carried out in the VII semester.
5. Students will be permitted to opt for one elective each from the list of Open Elective-I and Open Elective-II that are run by other departments. The minimum strength of the students should be 20 to run an elective course.
6. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculators will not be permitted in the examinations.

OPEN ELECTIVES

Open Elective-I			Open Elective-II		
S.No	**Course No.**	**Course Title**	**S.No**	**Course No.**	**Course Title**
1.	HUM350C	Communication Skills for Professionals (Except BME & BTE)	1.	CSE305C	Computer Networks
2.	HUM352C	Soft Skills And Interpersonal Communication	2.	CSE431C	Cyber Security
3.	MGT402C	Human Values, Ethics And IPR	3.	CHE457C	Industrial Safety
4.	MGT404C	Human Resource Management	4.	CE406C	Disaster Management
5.	HUM354C	Introduction To French Language	5.	ECE327C	Consumer Electronics
6.	HUM356C	Introduction To German Language			

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 4th YEAR (SEMESTER –VII) COMPUTER SCIENCE AND ENGINEERING
Choice Based Credit System Scheme of Studies & Examinations w.e.f. 2021-22

Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			
1.	PEC-IV	Program Elective-IV	3	0	0	25	75	0	100	3	3
2.	PEC-V	Program Elective-V	3	0	0	25	75	0	100	3	3
3.	PEC-VI	Program Elective-VI	3	0	0	25	75	0	100	3	3
4.	OEC-III	Open Elective-III	3	0	0	25	75	0	100	3	3
5.	BSC	Biology	3	0	0	25	75	0	100	3	3
6.	CSE481C	Professional Training Seminar (Level-3)	0	0	2	50	0	0	50	2	0
7.	CSE483C	Project-I	0	0	8	50	0	100	150	4	3
Total			**15**	**0**	**10**	**225**	**375**	**150**	**700**	**21**	**18**

For B.Tech (Hons) degree the students will study the following subjects in addition to the subjects mentioned above.

SEMESTER-VII											
Sl. No.	**Course Code**	**Course Title**	**Teaching Schedule**			**Marks of Class work**	**Examination Marks**		**Total**	**Credits**	**Duration of Exam**
			L	**T**	**P**		**Theory**	**Practical**			
B.Tech. (Hons.) in CSE with specialization in Blockchain (H1)											
1.	CSEH401C	Blockchain Technology and Applications	3	0	0	25	75	0	100	3	3
2.	CSEH481C	Project based on specialization	0	0	4	25	0	75	100	2	3
B.Tech. (Hons.) in CSE with specialization in Cyber Security (H2)											
1.	CSEH403C	Cyber Forensics and Cyber Laws	3	0	0	25	75	0	100	3	3
2.	CSEH481C	Project based on specialization	0	0	4	25	0	75	100	2	3
B.Tech. (Hons.) in CSE with specialization in Data Science (H3)											
1.	CSEH405C	Mathematical and Statistical Techniques	3	0	0	25	75	0	100	3	3
2.	CSEH481C	Project based on specialization	0	0	4	25	0	75	100	2	3
Total(H1/H2/H3)			**3**	**0**	**4**	**50**	**75**	**75**	**200**	**5**	**6**

Program Electives

Program Elective-IV		Program Elective-V		Program Elective-VI	
Course code	**Course title**	**Course code**	**Course title**	**Course code**	**Course title**
CSE401C	Cloud Architecture & Security[4]	CSE421C	Distributed Computing	CSE441C	Multimedia Technology
CSE403C	Machine Learning	CSE423C	Green Computing	CSE443C	Soft Computing
CSE405C	Software Design and Enterprise Computing	CSE425C	Software Agents	CSE445C	Software Measurements and Metrics
CSE407C	Natural Language Processing	CSEH403C	Cyber Forensics and Cyber Laws[2]	CSEH401C	Blockchain Technology and Applications[1]

[1]Not to be opted by B.Tech (Hons) students opting specialization in Blockchain
[2]Not to be opted by B.Tech (Hons) students opting specialization in Cyber Security
[4]Not to be opted by B.Tech (Hons) students opting specialization in IoT

NOTE:

1. Students will be permitted to opt for any one elective each from the list of Program Elective-IV, V and VI. The minimum strength of the students should be 20 to run an elective course.
2. The student pursuing B.Tech (Hons.) will choose subjects as per the specialization opted in the V semester.
3. The students pursuing B.Tech (Hons.) can choose one subject each from the list of Program Elective –IV, V and VI, except already opted as per the specialization (IoT (H1), Cyber security (H2) and Data Science (H3)). The students should choose different subjects.
4. Students will be permitted to opt for one elective from the list of Open Elective-III that is floated by other department. The minimum strength of the students should be 20 to run an elective course.
5. Assessment of Professional Training (Level-3) (CSE326C), undergone at the end of semester-VI, will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from the industry/ institute/ research lab/ training centre etc.
6. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculators will not be permitted in the examinations.

OPEN ELECTIVES

Open Elective-III		
S.No	**Course No.**	**Course Title**
1.	CSE340C	Artificial Intelligence & Expert Systems
2.	EE452C	Electrical and Hybrid Vehicles
3.	MGT401C	Entrepreneurship
4.	ME452C	Fundamentals of Sustainable Manufacturing
5.	CHE459C	Nano-Science and Nano-Technology
6.	EE454C	Smart Grid

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 4th YEAR (SEMESTER –VIII) COMPUTER SCIENCE AND ENGINEERING
Choice Based Credit System Scheme of Studies & Examinations w.e.f. 2021-22

Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			
1.	CSE402C	Advanced Computer Architecture (Gr. A)	3	0	0	25	75	0	100	3	3
2.	CSE404C	Software Project Management (Gr. A)	3	0	0	25	75	0	100	3	3
3.	CSE482C Or	Project-II (Gr. A)	0	0	18	50	0	100	150	09	3
	CSE484C	Professional Training (Level-4) (Gr. B)	0	0	0	100	0	250	350	15	3
4.	GPCSE	General Fitness for the Profession	0	0	0	0	0	100	100	0	0
Total (Gr. A)			**6**	**0**	**18**	**100**	**150**	**200**	**450**	**15**	**9**
Total (Gr. B)			**0**	**0**	**0**	**100**	**0**	**350**	**450**	**15**	**3**

NOTE:

1. Gr. A students will have to do project in the department under the supervision of faculty member along with two subjects at sr. no. 1 and 2.
2. Gr. B students will have to undergo Professional Training (Level-4) of at least one semester from the industry, institute, research lab, training centre etc. Students who have CGPA of minimum 7.0 till VI sem. with no backlog will only be permitted to proceed for Professional Training.
3. Each student will be allotted a supervisor from the deptt for both project as well as professional training.
4. Internal evaluation of Project –II and Professional Training (Level-4) will be carried out four times in a semester.
5. General Fitness For The Profession(GPCSE) is a compulsory & qualifying course **(Audit Pass)** under which student will be evaluated for his performance in all types of activities like Academics, Cultural, Sports, NSS, organisation of camps, social activities etc., during his all 8 semesters, at the end of 8th semester. Regarding this course student will be motivated during the induction programme at the time of admission, so that he/she will be vigilant for motivation towards these activities.The evaluation of the student for his / her General Fitness for Profession shall be carried out by a team consisting of:-
    - Dean FIT&CS
    - Chairperson of the Department
    - Senior Most faculty of the department
    - Senior Most faculty of the University other than the department
6. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculators will not be permitted in the examinations.

TOTAL CREDITS
B.Tech. (CSE) = 159 (including first year)

Semester	1	2	3	4	5	6	7	8	Total
Credit	20	18	21	21	24	19	21	15	159

TOTAL CREDITS
B.Tech. (Hons.) in CSE with specialization in selected areas = 177 (including first year)

Semester	1	2	3	4	5	6	7	8	Total
Credit	20	18	21	21	29	27	26	15	177

CSE 201C DATA STRUCTURES & ALGORITHMS
B. Tech. Semester – III (Computer Science and Engg.)
w.e.f. 2019-2020

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Exam	:	3 Hours

Course Objectives:

1. To analyse algorithms in terms of time, space and computational complexities.
2. To learn searching algorithms (Linear Search and Binary search) and implement them.
3. To study Stacks, Queues, Linked lists, Graph search and traversal techniques.
4. To study sorting algorithms i.e. Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort and Heap sort and compare their performance.

UNIT-I

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure operations: insertion, deletion, traversal etc. Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT-II

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT-III

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

UNIT-IV

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

TEXT BOOKS :

1. **1. Fundamentals of Data Structures, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.**

2. **Data Structures, Revised 1st Edition by Seymour Lipschutz , Scaum's Outline Series McGraw Hill**

REFERENCE BOOKS :

1. Algorithms, Data Structures, and Problem Solving with C++" , Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. How to Solve it by Computer , 2nd Impression by R. G. Dromey, Pearson Education.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

Upon successful completion of the course, students will demonstrate the ability to:

1. Analyze the algorithm for a problem solution and determine the time and computation complexity and justify the correctness.
2. Write the algorithm for Search problem (Linear Search and Binary Search) .
3. Write an algorithm for Stack, Queue, Linked list, Graph search and traversal techniques and analyze the same to determine the time and computation complexity.
4. Write an algorithm for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap sort and compare their performance in term of Space and time complexity.

CSE 203C COMPUTER ORGANIZATION AND ARCHITECTURE
B. Tech. Semester – III (Common with ECE 3rd Sem)
w.e.f. 2019-2020

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To study functional blocks of a computer and their working.
2. To learn CPU organization along with Instruction Level Architecture, different addressing modes and pipelining.
3. To learn about I/O devices and their working principles.
4. The understand the current state of art in memory system design

UNIT-I

Functional blocks of a computer : CPU, Memory, input/output subsystems, control unit , Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language , RTL Computer Buses (basic design using multiplexers), Bus width, Bus clocking(synchronous , asynchronous), bus arbitration, Bus examples(ISA bus, PCI bus, Universal serial bus) .

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic: integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc., multiplication – shift-and add, Booth multiplier, carry save multiplier

UNIT-II

CPU Organization: Instruction set architecture of a CPU, interpretation of instructions, Instruction set based classification of processors (RISC, CISC, and their comparison), CPU Architecture types (accumulator, register, stack, memory/ register) Instruction cycle (Fetch-Decode-Execute)

Addressing modes (register, immediate, direct, indirect, indexed); Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid) Pipelining (basic concepts, throughput and speedup, hazards)

UNIT-III

Input /Output & Control Unit: Input Output Interface, Asynchronous data transfer (Strobe control, handshaking, serial transfer); Serial Vs parallel data transmission; Modes of data transfer, Programmed I/O, Interrupt driven, Direct Memory access (DMA).

Control Unit design:- Control unit design methods (hardwired & microprogrammed) Control Memory, Address Sequencing, Micro instructions.

UNIT-IV

Memory Organization: Memory device characteristics (access/ cycle time, cost per bit, volatility, storage density); Memory hierarchy; Main memory Design (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types, their comparison); Associative memory Design, Match logic, Locality of reference principle (Temporal & Spatial)

Cache mapping (Direct, associative, set associative); Cache writing policies (Copy-Back, Write-through); Virtual Memory (Address space, memory space, Address mapping using pages, Page replacement)

TEXT BOOKS:

1. **Computer System Architecture by M. Mano, Prentice-Hall.**

2. **Structured Computer Organisation by A.S. Tanenbaum, 6th edition, Prentice-Hall of India, Eastern Economic Edition**

REFERENCE BOOKS:

1. Computer Organization, 5th Edi, by Carl Hamacher, Zvonko Vranesic,2002, SafwatZaky.
2. Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.
3. Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH
4. Computer Organisation& Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course students will learn the following:-

1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution pipelining, parallelism and microprogramming
3. How I/O devices are accessed and its principles.
4. The memory organization along with cache and virtual memory concepts.

CSE205C INFORMATION TECHNOLOGY WORKSHOP
B. Tech. Semester – III (Computer Science and Engg.)
w.e.f. 2019-2020

L	T	P	Credits			
1	0	4	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To study MATLAB for programming purposes
2. To learn and explore MATLAB programming constructs.
3. To introduce Arrays for matrices representation and Graphics for fractals.
4. To write and debug the code written in MATLAB

UNIT-I

Introduction: Data types and variables: Introduction to MATLAB, Data Types, Inter-conversion of Data types, MATLAB Variables, Keywords and Constant, Session Command. MATLAB Operators and Operations: Operators(Arithmetic, Relational, Logical, Bitwise), Set Operations, Operator Precedence, Mathematical Functions.

UNIT-II

MATLAB Programming : Script and Function, Decision Making, Loops, branches, Functions, Working on Script File (Creating, Saving and Executing), MATLAB I/O, Formatted I/O Method,.

UNIT-III

Arrays: Introduction to Matrices, Operations on Arrays/Matrices, Manipulations of Arrays/Matrices, Expansion of Matrix Size, Reduction of Matrices/Arrays order,
Graphics: Introduction to plot, Basic 2-D Plots(Style options, Labels, Axis control, etc.), specialized 2-D Plots, drawing multiple plots. Using MATLAB for fractals and chaos and Conway game of life

UNIT-IV

File Handling: File Handling: Introduction to file handling, working on files, accessing of Text File, Saving/ Loading MATLAB Variables, reading data without opening file, reading and writing Excel.
Debugging: Introduction to debugging, Break points, debugger, stepping, watching variable values, debugging commands.

TEXT BOOKS:

1. **Delores M. Etter, David C. Kuncicky, Holly Moore, "Introduction to MATLAB 7.0", Pearson, 2013.**
2. **RudraPratap, "Getting Started with MATLAB", OXFORD University Press, 2010.**
3. **Agam Kumar Tyagi, "MATLAB and Simulink for Engineers", University Press, 2012.**

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

Upon successful completion of the course, students will be able to

1. Use MATLAB for programming purposes
2. Learn and explore MATLAB tools.
3. Use this learning experience to develop small applications/games.
4. To write and debug the code written in MATLAB

MATH307C MATHEMATICS-III
PARTIAL DIFFERENTAL EQUATIONS & TRANSFORMS
B. Tech. Semester – III (Computer Science and Engg.)
(w.e.f. Session 2019-2020)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100Marks
				Duration of Exam.	:	3 Hours

UNIT-I

First order partial differential equations, solutions of first order linear and non linear PDEs. Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method.

UNIT-II

Flows, vibrations and diffusions, second-order linear equations and their- classification, Initial and boundary conditions (with an informal description of well-posed problems), D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation. Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables. Boundary-value problems: Solution of boundary-value problems for various linear PDEs in Various geometries.

UNIT-III

Polynomials, Orthogonal Polynomials-Lagrange's, Chebysev Polynomials; Trigonometric Polynomials, LaplaceTransform, Properties of Laplace Transform, Laplace transform of periodic function. Finding inverse Laplace transform by different. methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs 'and PDEs by Laplace Transform method.

UNIT-IV

Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications.

TEXT BOOKS :

1. **Erwin Kreyszig -Advanced Engineering Mathematics, 9th Edition, John' Wiley & Sons, 2006.**
2. **S.S. Sastry, Engineering Mathematics, PHI, Vol. I & II.**
3. **B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.**
4. **Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.**

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

1. The students will understand solutions of first and second order linear and non linear PDFs and their classifications.
2. The students will understand to solve various naming equations using separation of variables method.
3. The students will come across various Polynomials such as-Lagrange's, Chebysev Polynomials, Trigonometric Polynomials.
4. The students will be able to solve various engineering mathematical problems using various transforms such as Laplace Transform Fourier Transforms, Z-transform and Wavelet transforms.

ECE203C DIGITAL SYSYTEM DESIGN

B. Tech. Semester – III (Common with ECE and CSE)

w.e.f 2019-2020

L	T	P	Credits			
3	0	0	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total Marks	**:**	**100**
				Duration of Exam.	**:**	**3 Hours**

UNIT- I

Logic Simplification: Review of Boolean Algebra and DeMorgan's Theorem, SOP & POS forms, Canonical forms, Realization Using Gates. Karnaugh maps up to 6 variables, VEM technique, Binary codes, Code Conversion. Numericals.

UNIT- II

Combinational & Sequential Logic Design: Comparators, Multiplexers, Encoder, Decoder, Half and Full Adders, Subtractors, Parallel Adders, Adder with Look Ahead Carry, BCD Adder. Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Sequence Generator, Shift registers.

UNIT III

Finite state machines: Introduction, Design of synchronous FSM Driver & Multiplexed Display: Serial Binary Adder, Sequence detector, Parity Bit Generator, pulse train generator. Algorithmic State Machines charts: Introduction, Component of ASM chart, Introductory examples of ASM chart.

UNIT IV

Logic Families and PLDs: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing. Concept of Programmable logic devices like PAL, PLA, ROM, CPLD and FPGA. Logic implementation using Programmable Devices.

TEXT/REFERENCE BOOKS:

1. **R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009**
2. **A.Anand Kumar, "Switching Theory & Logic Design", PHI.**
3. **W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.**
4. **D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989.**
5. **Morris Mano, "Digital Design: With an Introduction to the Verilog HDL", 5th Edition, Pearson Education, 2013.**
6. **Morris Mano, "Logic & Computer Fundamentals", 4th Edition, Pearson Education.**

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

Upon successful completion of the course, students will demonstrate the ability to:

1. Understand binary codes, binary arithmetic, minimization techniques and their relevance to digital logic design.
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder and sequential logic circuits.
3. Understand finite state machines and develop a digital logic to find out sustainable solution of a real life problem.
4. Understand and implement various digital integrated circuits using different logic families and simple systems composed of PLDs.

MGT201C ENGINEERING ECONOMICS

B. Tech. Semester – III (Common for all Branches Except BT& BME)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total Marks	:	100
				Duration of Exam	:	3 Hours

UNIT-I

Concept of Economics- various definitions, nature of Economic problem, Micro and macro economics-their features and scope, production possibility curve, Relationship between Science, Engineering Technology and Economics. Utility: Concept and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility – its importance and practical applications**.**

UNIT-II

Demand: Concept, Individual and Market demand schedule, Law of demand, shape of demand curve. Elasticity of demand: Concept, measurement of elasticity of demand, factors affecting elasticity of demand, practical application of elasticity of demand. Various concepts of cost: Fixed cost, variable cost, average cost, marginal cost, money cost, real cost, opportunity cost.

UNIT III

Production : Meaning of production and factors of production; Law of variable proportions, Law of Return to Scale, Internet and External economics and diseconomies of scale. Meaning of Market, Type of Marker– perfect Competition, Monopoly, Oligopoly, Monopolistic competition (Main features of these markers).

UNIT-IV

Supply: Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on price. Nature and characteristics of Indian economy, privatization – meaning, merits and demerits. Globalisation – meaning, merits and demerits.

TEXT BOOKS:

1. **Ahuja H.L"Micro Ecomomic Theory" S. Chand Publication, New Delhi**
2. **Dewett K.K "Modern Ecomomic Theory" S. Chand Publication, New Delhi**
3. **Jain T.R, Grover M.L, Ohri V.K Khanna O.P,"Economics for engineers" V.K .Publication ,New Delhi**
4. **Dr. R.K. Agarwal & Rashmi Agarwal, " Principles and Applications of Economic", Pragati Prakashan.**

SUGGESTED BOOKS:

1. Jhingan 1. Jhingan M.L"Micro Ecomomic Theory" S.Chand Publication ,New Delhi
2. Chopra P.N "Principle of Economics" Kalyani Publishers, Delhi
3. Mishra S.K "Modern Micro Economics" Pragati Publication Mumbai. 44
4. Dwivedi D.N "Micro Economics " Pearson Education, New Delhi.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

COURSE OUTCOMES:

Upon Successful Completion of this Course the students will:-

1. Acquire the skills to apply the basics of economics and cost analysis to engineering and take economically sound decision.
2. Acquaint students with the basic economic concepts and their operational significance.
3. Be able to think systematically and objectively about cotemporary economic problems.
4. Learn the ability to optimally utilize the limited resources of the organization.

CSE 281C DATA STRUCTURES & ALGORITHMS LAB

B. Tech. Semester – III (Computer Science and Engg)

L	T	P	Credits			
0	0	4	2	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To implement an algorithm for a problem and analyze its time and computation complexity.
2. To implement the algorithm for Search problem (Linear Search and Binary Search) .
3. Solve the given problem of Stack , Queue ,Linked list, Graph search and traversal implement it and analyze the same to determine the time and computation complexity.
4. To implement algorithms for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap sort and compare their performance in term of Space and time complexity.

List of Programs:

1. Write a program to perform binary search in an array.
2. Write a program to perform binary search using recursion.
3. Write a program to perform linear search in 2D array.
4. Write a program to perform various operations on matrices.
5. Write a program to swap two nos. using calls by value and reference.
6. Write a program to implement bubble sort.
7. Write a program to implement insertion sort.
8. Write a program to implement selection sort.
9. Write a program of link list implementation of a stack.
10. Write a program of link list implementation of a queue.
11. Write a program of array implementation of a stack.
12. Write a program of array implementation of a queue.
13. Write a program to search an element in a link list.
14. Write a program to maintain a link list.
15. Write a program to implement BST

The teacher concerned may give 10 more exercises based upon syllabus CSE201C

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Implement the algorithm for a problem solution, determine the time and computation complexity and justify the correctness.
2. Implement various searching algorithms (Linear Search and Binary Search) .
3. Solve the given problem of Stack, Queue, Linked list, Graph search and traversal, implement and analyze the same to determine the time and computation complexity.
4. Write and implement the algorithms for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap sort and compare their performance in term of Space and time complexity.

ECE283C Digital System Design Lab

B. Tech. Semester – III (Computer Science and Engg)

L	T	P	Credits			
0	0	2	1	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100Marks
				Duration of Examination	:	3 Hours

LIST OF EXPERIMENTS:

1 To study & design basic gates.

2 To realize and minimize five & six variables using K-Map method.

3 To verify the operation of Multiplexer & De-multiplexer.

4 To perform Half adder and Full adder

5 To perform Half substractor and Full substractor.

6 To verify the truth table of S-R,J-K,T & D Type flip flop .

7 To study FLIP- FLOP conversion.

8 To design & verify the operation of 3 bit synchronous counter.

9 To design & verify the operation of synchronous UP/DOWN decade counter using JK flip

10 To design & verify operation of Asynchronous counter.

11 To design and implement a circuit to detect a Count Sequence.

12 Conversion of state diagram to the state table and implement it using logical circuit.

Text/Reference Books:

1. **R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009**
2. **A.Anand Kumar, "Switching Theory & Logic Design", PHI.**
3. **W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.**

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/ disallowed.

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Implement the basic digital theory concepts practically and will be able to verify various results derived in theory.
2. Design, analyze and troubleshoot broad range of combinational and sequential circuits for various practical problems using basic gates and flip flops I.C's.
3. Develop technical writing skills to communication effectively and present one's own work.
4. Acquire teamwork skills for finding sustainable solution of a complex problem and working effectively in groups.

CSE202C WEB & INTERNET TECHNOLOGIES

B. Tech. Semester – IV (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100Marks
				Duration of Exam.	:	3 Hours

Course Objectives:

1. To understand the role of HTML, CSS, XML, JavaScript and protocols in the workings of web and web applications.
2. To design a responsive web site using HTML5 and CSS.
3. To build Dynamic web site using server side PHP Programming and Database connectivity.
4. To understand the various technologies to build dynamic content of website.

UNIT-I

Introduction to the Internet, The world wide web: The idea of hypertext and hyper media; How the web works-HTTP, HTML and URLs; How the browser works-MIME types, plugins and helper applications; The standards-HTML, XML, XHTML and the W3C.

Hypertext markup language: The anatomy of an HTML document; Marking up for structure and style: basic page markup, absolute and relative links, ordered and unordered lists, embedding images and controlling appearance, table creation and use, frames, nesting and targeting.

Descriptive markup: Meta tags for common tasks, semantic tags for aiding search, the doubling code and RDF.

UNIT-II

Separating style from structure with style sheets: Internal style specifications within HTML, External linked style specification using CSS, page and site design considerations.

Client side programming: Introduction to the JavaScript syntax, the JavaScript object model, Event handling, Output in JavaScript, Forms handling, miscellaneous topics such as cookies, hidden fields, and images; Applications.

UNIT-III

Server side programming: Introduction to Server Side Technologies CGI/ASP/JSP., Programming languages for server Side Scripting, Configuring the server to support CGI, applications; Input/ output operations on the WWW, Forms processing, (using PERL/VBSCRIPT/JavaSCIPT)

UNIT-IV

Other dynamic content Technologies: introduction to ASP & JSP, Delivering multimedia over web pages, The VRML idea, The Java phenomenon-applets and servelets, issues and web development.

Introduction to Microsoft .NET Technology and its comparison with the competing Technologies.

TEXT BOOKS:-

1. **Beginning XHTML by Frank Boumpery, Cassandra Greer, Dave Raggett, Jenny Raggett, Sebastian Schnitzenbaumer& ted Wugofski, 2000, WROX press (Indian Shroff Publ. SPD) 1st edition**
2. **Web Technologies By Achyut S Godbole, Atul Kahate, 2003, T.M.H**
3. **Internet & World Wide Web How to program by P.J Deitel & H.M Deitel, Pearson**

REFERENCE BOOKS:-

1. HTML &XHTML:The Definitive Guide by Chuck Musciano, Bill Kennedy, 2000, 4th Edi.
2. XHTML Black Book by Steven Holzner, 2000
3. CGI Programming on the World Wide Web. O'Reilly Associates.
4. Internet and Web Technologies – Raj Kamal, 2002, T.M.H

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

Upon completion of the course the students will be able to

1. Understand, analyze and apply the role of languages like HTML, CSS, XML, JavaScript and protocols in the workings of web and web applications.
2. Create a good, effective and dynamic website using HTML5 and CSS
3. Build Dynamic web site using server side PHP Programming and Database connectivity.
4. Understand the various technologies to build dynamic content of website.

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CSE204C OPERATING SYSTEMS

B. Tech. Semester –I V (Computer Science and Engg.)

w.e.f. 2019-2020

L	T	P	Credits			
3	0	0	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To understand the mechanisms of OS to handle processes and threads and their communication.
2. To understand the process management mechanisms and scheduling algorithms.
3. To understand the mechanisms involved in memory management in OS and virtual memory concepts.
4. To understand the file management and deadlocks handling techniques in OS.

UNIT-I

Introduction: Introduction to Operating System Concepts (including Multitasking, multiprogramming, multi user, Multithreading etc)., Generations of operating systems Types of Operating Systems: Batch operating system, Time-sharing systems, Distributed OS, Network OS, Real Time OS; Various Operating system services, architecture, System programs and calls. Monolithic , microkernel operating systems, concept of virtual machine

Unix System and Windows NT Overview: Unix system call for processes and file system management, Shell interpreter, Windows NT architecture overview, Windows NT file system.

UNIT-II

Process Management: Process definition, different states of a process , process state transitions, process control box(PCB), context switching

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Process scheduling, Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

UNIT-III

Memory Management: Logical & Physical Address Space, swapping, contiguous memory allocation, non-contiguous memory allocation, fixed and variable partitions – internal and external fragmentation and compaction; Paging : principle of operation- page allocation – page allocation- hardware support for paging, Protection and sharing disadvantages of paging , Segmentation techniques, segmentation with paging;

Virtual Memory: basic concepts of VM, management - Demand Paging & Page-Replacement Algorithms; Demand Segmentation.

UNIT-IV

Process-Synchronization & Deadlocks: Critical Section Problems, semaphores; methods for handling deadlocks-deadlock prevention, avoidance & detection; deadlock recovery.

I/O Systems: I/O Hardware, Application I/O Interface, Kernel, Transforming I/O requests, Performance Issues.

File System: Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, Introduction to distributed file system.

TEXT BOOKS:

1. **Operating System Concepts by Silberchatz et al, 5th edition, 1998, Addison-Wesley.**
2. **Modern Operating Systems by A. Tanenbaum, 1992, Prentice-Hall.**
3. **Operating Systems Internals and Design Principles by William Stallings,4thedition, 2001, Prentice-Hall**

REFERENCE BOOKS :

1. Operating System by Peterson, 1985, AW.
2. Operating System by Milankovic, 1990, TMH.
3. Operating System Incorporating With Unix& Windows By Colin Ritche, 1974, TMH.
4. Operating Systems by Mandrik& Donovan, TMH
5. Operating Systems – Advanced Concepts By MukeshSinghal , N.G. Shivaratri, 2003, T.M.H

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course students will learn the following:-

1. Understand the mechanisms of OS to handle processes and threads and their communication.
2. Understand the process management mechanisms and scheduling algorithms.
3. Understand the mechanisms involved in memory management in OS and virtual memory concepts.
4. Understand the file management and deadlocks handling techniques.

CSE206C DESIGN AND ANALYSIS OF ALGORITHMS

B. Tech. Semester – IV (Computer Science and Engg.)

w.e.f. 2019-2020

L	T	P	Credits			
3	0	0	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. To apply the algorithms and design techniques to solve problems.
3. To explain the major graph algorithms and their analyses and to employ graphs to model engineering problems.
4. To understand the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

UNIT-I

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT-II

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knap Sack TSP. Heuristics-characteristics and their application domains.

UNIT-III

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT-IV

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.
Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

TEXT BOOKS:

1. **Introduction to Algorithms, 4TH Edition, Thomas H Cormen, MIT Press/McGraw-Hill.**
2. **Fundamentals of Algorithms – E. Horowitz et al.**

REFERENCE BOOKS:

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.

2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Note:

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2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course students will be able to:-

1. Analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. Apply the algorithms and design techniques to solve problems;
3. Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems,
4. Understand the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

CSE208C DISCRETE MATHEMATICS

B. Tech. Semester – IV(Computer Science and Engg.)

w.e.f. 2019-2020

L	T	P	Credits			
3	0	0	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To Use set notation, terms related to sets, relations and functions and to construct induction proofs.
2. To understand the concept of logical equivalence, truthtables, rules of inference and predicate logic.
3. To classify the algebraic structures and evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
4. To develop a given problem as graph networks and solve with techniques of graph theory and tree concepts.

UNIT-I

Sets, Relation and Function: Operations and Laws of Sets, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets Cartesian Products, Disjunctive and Conjunctive Normal Form Binary Relation : representation of relations, Partial Ordering Relation, Equivalence Relation, Image of a Set, Function: Sum and Product of Functions, Bijective functions, Inverse and Composite

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT-II

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination. Introduction to recurrence relations and generating functions.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof, Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT-III

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function,

UNIT-IV

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and

Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

TEXT BOOKS:

1. **Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill**
2. **Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.**
3. **C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.**

REFERENCE BOOKS:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science" , TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course students will learn the following:-

1. Use set notation, terms related to sets, relations and functions and to construct induction proofs.
2. Understand the concept of logical equivalence, truthtables, rules of inference and predicate logic.
3. Classify the algebraic structures and evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
4. Develop a given problem as graph networks and solve with techniques of graph theory and tree concepts.

MC201C ENVIRONMENTAL STUDIES

B. Tech. Semester – III/IV(Computer Science and Engg.)

w.e.f. 2019-2020

L	T	P	Credits			
3	0	0	0	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

The Multidisciplinary Nature of Environmental Studies, .Introduction to Environment: Definition, Scope, and importance of environmental studies; need for public awareness.
Environmental Pollution: Definition, Cause and effects of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Role of an individual in prevention of pollution, Pollution case studies

UNIT- II

Natural Resources: Water resources: over-utilization, floods, drought, dams-benefits and problems; Mineral resources: Use and exploitation, environmental effects; Food resources: changes caused by modern agriculture, fertilizer-pesticide problems, water logging, Energy resources: Growing energy needs, renewable and non renewable energy sources; Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT –III

Ecosystems and Biodiversity: Concept of an ecosystem, Structure and function, Energy flow, Ecological succession, ecological pyramids. Concept of Biodiversity, definition and types, Hot-spots of biodiversity; Threats to biodiversity, Endangered and endemic species of India, Conservation of biodiversity.

UNIT –IV

Social Issues and Environment: Water conservation, rain water harvesting, Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, Public awareness. Population growth, variation among nations, Family Welfare Programme. Human Population and the Environment - Population growth, Population explosion, Women and Child Welfare.

Field Work - Visit to a local area to document environmental assets—river/forest/grassland/hill/ mountain. Visit to a local polluted site—Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems—pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

REFERNCE BOOKS:

1. **A Textbook of Environmental Studies by Asthana D.K. and Asthana Meera**
2. **Fundamental Concepts in Environmental Studies by Mishra D.D.**
3. **Environmental Studies by S.C Sharma M.P Poonia**
4. **Textbook of Environmental Studies for Undergraduate by Erach Bharucha**
5. **Environmental Studies: Third Edition by R. Rajagopalan**

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
   For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

   Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

On completion of the course, the students will be able to:

1. Develop concepts of basic environmental factors.
2. Understand the basic issues of ecosystem and its structural and functional aspects and vast biodiversity
3. Outline aspects of environmental issues.
4. Understand the knowledge of energy resources and their environmental implications

MC203C CONSTITUTION OF INDIA

B. Tech. Semester – III/IV(Computer Science and Engg.)

w.e.f. 2019-2020

L	T	P	Credits			
3	0	0	0	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

To make students conscious citizens of India and well equip them to explain and understand the importance of constitution of the country

Unit I

Philosophy of Indian Constitution: Ideological Basis and Salient Features of Indian Constitution, Fundamental Rights & Duties of the Citizens, Directive Principles of State Policy

Unit II

Nature and Dynamics of Indian Federalism: Federalism: Theory and Practice in India, Federal Features of the Indian Constitution, Legislative, Administrative and Financial Relations between the Union and the States

Unit III

Union and State Legislature: Parliament: Composition, Functions and Working of the Parliamentary system, State Legislature: Composition and Functions of Vidhan Sabha/ Vidhan Parishad

Unit IV

Centre and State: Executive and Judiciary: President, Prime Minister and Council of Ministers, Governor, Chief Minister and Council of Ministers, Judiciary: Supreme Court; High Court

Scheme of End Semester Examinations (Major Test):

1. The duration of examinations will be three hours.
2. Nine questions of 15 marks each will be set out of which the students will have to attempt five questions in all.
3. First question of 15 marks will be compulsory. It will cover all the four units of the syllabus. The nature of the questions in each unit will depend upon the nature of content therein. The questions may have sub-parts with marks assigned against each.
4. Question No 02 to 09 of 15 marks each will be set from the four units of the syllabus --- two from each unit.
5. In addition to first compulsory question the students will have to attempt four more questions, selecting one from each unit.

Recommended Readings:

1. **Austin G.,** ***The Indian Constitution: Corner Stone of a Nation,*** **New Delhi: Oxford University Press, 1966**
2. **Basu D.D.,** ***An Introduction to the Constitution of India,*** **New Delhi: Prentice Hall, 1994**

3. **Kothari R., *Politics in India*, New Delhi: Orient Language, 1970**
4. **Siwach J.R., *Dynamics of Indian Government andPolitics*, New Delhi: Sterling Publishers, 1985**

5. **Bhambhri C.P., *The Indian State--FiftyYears*, New Delhi: Shipra, 1997**
6. **Ghai U.R., *IndianPoliticalSystem*, Jalandhar: New Academic Publishing Company, 2010**

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

   For student admitted in B. Tech. 1st Semester (C-Scheme) in 2019 and all trailing students, Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

At the end of the course students will be able to

1. To understand basic features of the constitution and rights and duties of Indian citizens
2. To understand the basic structure of Centre and State Government
3. To get acquainted with the nature of parliamentary form of Government
4. To have knowledge of the executive and judiciary powers in Indian democratic set-up

MGT202C ORGANIZATIONAL BEHAVIOUR

B. Tech. Semester – IV(Computer Science and Engg.)

w.e.f. 2019-2020

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100Marks
				Duration of Examination	:	3 Hours

UNIT-I

Introduction: Definition and concept of Organizational Behaviour, nature and scope of OB, elements of OB, contributing disciplines to OB, challenges for OB, evolution of OB.

UNIT-II

Individual processes: Attitudes, Values; Perception – concept, process and applications; Personality - concept, determinants, theories and applications; Learning – concept and theories of learning.

UNIT-III

Team processes: Motivation – concept and theories of motivation; Group behaviour – concept, types of group, group development, group dynamics; Teams - types, creating effective teams.

UNIT-IV

Organizational processes and Stress management: organizational structure – elements of organizational structure; organizational change – concept, resistance to change, managing resistance to change, Lewin's three- step model of change; Stress – sources, consequences and management.

TEXT BOOKS:

1. Robbins Judge and Vohra, Organizational Behaviour, Pearson, New Delhi.
2. Khanka S S, Organizational Behavior, S.Chand& Company Pvt. Ltd., New Delhi.

REFERENCE BOOKS :

1. Greenberg Jerald, Behavior in Organizations, PHI, New Delhi.
2. Parikh and Gupta, OrganisationalBehaviour, Mc Graw Hill, New Delhi.
3. PareekUdai, Understanding Organizational Behaviour, Oxford University Press, New Delhi.
4. Aswathappa K., OrganisationalBehaviour, Himalaya Publishing House, New Delhi.
5. Luthans, F. Organizational Behavior, McGraw Hill Education.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

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Course Outcomes:

On completion of this course, the students will be able to

1. Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
2. Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
3. Analyze the complexities associated with management of the group behavior in the organization.
4. Demonstrate how the organizational behavior can integrate in understanding the motivation behind behavior of people in the organization.

CSE282C WEB & ITERNET TECHNOLOGIES LAB

B. Tech. Semester – III (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100Marks**
				Duration of Examination	:	**3 Hours**

Course Objectives:

1. To develop web pages using mark up languages like HTML, DHTML and style sheets for making it more presentable to the user.
2. To develop dynamic web pages using client side programming and server side programming.
3. To develop interactive web applications using ASP.NET Framework.
4. To develop PHP programs for interactive web pages

List of practicals

1 A Simple HTML home page provide links to move to other pages like hobbies, educational info, personal info etc.
2 A HTML program to illustrate the use of frame and frameset tags of HTML.
3 A HTML Program which use a HTML controls to create a student information form to collect student's information like name, address, phone, email, sex, birth date, hobbies etc. Download
4 A HTML Program which demonstrates loops like for loop, do while, while in java script.
5 A HTML Program which demonstrates the use of functions in java script.
6 A HTML Program which demonstrates various events like onclick, ondbclick, onfocus, onblur, onchange, onmouseover, onmouseover, window event, onload, onunload event.
7 A HTML Program to create various functions and sub routines to validate the data entered by user in form.
8 Create a program to illustrate the concept of associative array in PHP.
9 Create PHP program to implement the concept of Session management.
10 Create a PHP program to display student information in webpage. Student's data is stored in My SQL database.
11 Create a PHP program to insert student information from HTML form. Student's data is stored in My SQL database.

Note: More exercises based on CSE202C may be given by the teacher

Course Outcomes:

After successful completion of the course, the students will be able to:

1. Develop web pages using mark up languages like HTML, DHTML and style sheets for making it more presentable to the user.
2. Develop dynamic web pages using client side programming and server side programming.
3. Develop interactive web applications using ASP.NET Framework.
4. Develop PHP programs for interactive web pages.

CSE 284-C OPERATING SYSTEMS LAB

B. Tech. Semester – IV (Computer Science and Engg)

L	T	P	Credits			
		4	1	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100Marks**
				Duration of Examination	:	**3 Hours**

Course Objectives:

1. To understand the concepts of operating system, features, advantage and disadvantage of different OS.
2. To demonstrate the Process scheduling algorithms in OS.
3. To understand the Windows and Linux administration.
4. To work in shell environment.

List of Practicals:

1) Study of WINDOWS 2000 Operating System.

2) Administration of WINDOWS 2000 (including DNS,LDAP, Directory Services).

3) Study of LINUX Operating System (Linux kernel, shell, basic commands pipe & filter commands).

4) Administration of LINUX Operating System.

5) Writing of Shell Scripts (Shell programming).

6) AWK programming.

Course Outcomes:

On successful completion of the course, the students will be able to:

1. Understand the concepts of operating system, features, advantage and disadvantage of different OS.
2. Demonstrate the Process scheduling algorithms in OS.
3. Understand the concepts of Windows and Linux administration.
4. Work in shell environment.

CSE 286-C DESIGN AND ANALYSIS OF ALGORITHMS LAB

B. Tech. Semester – IV (Computer Science and Engg.)

w.e.f. 2019-2020

L	T	P	Credits			
_	_	4	2	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100Marks**
				Duration of Examination	:	**3 Hours**

Course Objectives:

1. To develop and code program for the algorithms and analyze it to determine its computational complexity.
2. To identify and analyze worst-case running times of algorithms.
3. To model given engineering problem using graph and trees and write the corresponding algorithm to solve the problems.
4. To strengthen the ability to identify and apply the suitable algorithm for the given real world problem.

List of Programs:

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the lIst to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. Implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3. a. Obtain the Topological ordering of vertices in a given digraph.
   b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
4. Implement 0/1 Knapsack problem using Dynamic Programming.
5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijikstra‟s algorithm.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Kristal‟s algorithm.
7. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.

   b. Check whether a given graph is connected or not using DFS method.
8. Find a subset of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.
9. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
10. Find Minimum Cost Spanning Tree of a given undirected graph using Prim‟s algorithm.

11. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using Open and determine the speed-up achieved.
12. Implement N Queen's problem using Back Tracking.

Note:

More exercises based on CSE 206-C may be given by the teacher

Course Outcomes:

Upon successful completion of the course students will learn:-

1. Develop and code program for the algorithms and analyze it to determine its computational complexity.
2. Identify and analyze worst-case running times of algorithms.
3. Model given engineering problem using graph and trees and write the corresponding algorithm to solve the problems.
4. Identify and apply the suitable algorithm for the given real world problem.

CSE 301C OBJECT ORIENTED PROGRAMMING

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To familiarize students with basic concepts of object oriented programming
2. To familiarize students with operator overloading, inheritance, virtual functions and friend functions.
3. To familiarize students with advanced concepts of object oriented programming like templates and exception handling

UNIT- I

Basic Concepts Of Object Oriented Programming:- Procedural Vs. Object oriented Programming, C++ Standard Library, Preprocessor Directives, illustrative Simple C++ Programs. Header Files and Namespaces, library files. Object Oriented Concepts: Introduction to Objects and Classes, Data Abstraction, Encapsulation (Information Hiding), Access Modifiers: Controlling access to a class, method, or variable (public, protected, private), Polymorphism, Inheritance, and Reusability

Classes: - Introduction, Structure Vs. Class, Class Scope and Accessing Class Members, Initializing Class Objects: Constructors.

UNIT- II

Destructors, Friend Functions And Operator Overloading:- Destructors, Static Class Members, Const(Constant) Object And Const Member Functions, Object as Member of Classes, Friend Function and Friend Classes, Using This Pointer, Dynamic Memory Allocation with New and Delete, Container Classes and Iterators, Function overloading

Operator Overloading: - Introduction, Fundamentals of Operator Overloading, Restrictions on Operators Overloading, Operator Functions as Class Members vs. as Friend Functions, Overloading Binary Operators (+,-,*, /,=),Overloading Unary Operators(-,++,--,)

UNIT- III

Inheritance And Virtual Functions:- Introduction, Types of Inheritance, Base Classes And Derived Classes, Virtual Base class, Casting Base Class Pointers to Derived- Class Pointers, Using Member Functions, Overriding Base - Class Members in a Derived Class, Public, Protected and Private Inheritance, Using Constructors and Destructors in derived Classes, Composition Vs. Inheritance, Overloading Vs. Overriding. Run Time Polymorphism, Introduction to Virtual Functions, Pure Virtual Functions, Abstract Base Classes and Concrete Classes, Dynamic Binding, Virtual Destructors, Dynamic Binding.

UNIT-IV

Files, Templates And Exception Handling: - Files and I/O Streams and various operation on files. Stream Input/output Classes and Objects, Stream Output, Stream Input, Unformatted I/O (with read and write), Stream Manipulators, Stream Format States, Stream Error States.

Templates & Exception Handling: - Function Templates, Overloading Template Functions, Class Template, Class Templates and Non-Type Parameters, Templates and Inheritance, Templates and Friends.

Basics of C++ Exception Handling: - Try Throwing, Catch, and Throwing an Exception; - Catching an Exception, Re-throwing an Exception, Processing Unexpected Exceptions, Constructors, Destructors and Exception Handling.

TEXT / REFERENCE BOOKS:

1. **Object Oriented Programming in Turbo C++ by Robert Lafore ,1994, The WAITE Group Press.**
2. **Programming with C++ By D Ravichandran, 2003, T.M.H 3. Object oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill.**
3. **C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall**
4. **Computing Concepts with C++ Essentials by Horstmann, 2003, John Wiley,**
5. **The Complete Reference in C++ By Herbert Schildt, 2002, TMH.**
6. **C++ Programming Fundamentals by Chuck Easttom, Firewall Media.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, students will be able:

1. To understand the difference between object oriented programming and procedural programming.
2. To understand the basic concepts of object oriented programming
3. To understand and implement C++ features such as Operator overloading, inheritance, virtual functions and friend functions.
4. To understand and apply the concepts of templates and exception handling

CSE303C DATABASE MANAGEMENT SYSTEMS
B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
3. To understand and use data manipulation language to query, update, and manage a Database
4. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.

UNIT- I

Database system architecture: - Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: - Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

UNIT-II

Relational query languages:- Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: - Domain and data dependency, Armstrong's axiom, Normal forms, Dependency preservation, Lossless design.

Query processing and optimization: - Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

UNIT- III

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

UNIT- IV

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

TEXT/REFERENCES BOOKS:

1. **"Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.**
2. **"Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.**

3. **"Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education**
4. **"Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes
After successful completion of the course, students will be able to:

1. Understand basic concepts of database system and data models for relevant problems.
2. Understand the basic elements of a relational database management system.
3. Design entity relationship model and convert entity relationship diagrams into rdbms and formulate SQL queries on the data.
4. Apply normalization for the development of application software.

CSE305C COMPUTER NETWORKS

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To learn the concepts, vocabulary and techniques currently used in the area of computer networks.
2. To understand the concepts of the OSI model and the TCP/IP model.
3. To be familiar with wireless networking concepts
4. To be familiar with contemporary issues in networking technologies.

UNIT- I

OSI Reference Model and Network Architecture: Introduction to Computer Networks, Example Networks ARPANET, Internet, Private Networks, and Network Topologies: Bus, Star, Ring, Hybrid, Tree, Complete, Irregular –Topology; Types of Networks: Local Area Networks, Metropolitan Area Networks, Wide Area Networks; layering architecture of networks, OSI model, Functions of each layer, Services and Protocols of each layer.

UNIT-II

TCP/IP: Introduction, History of TCP/IP, Layers of TCP/IP, Protocols, Internet Protocol, Transmission Control Protocol , User Datagram Protocol, IP Addressing, IP address classes, Subnet Addressing, Internet Control Protocols, ARP, RARP, ICMP, Application Layer, Domain Name System, Email – SMTP, POP,IMAP; FTP, NNTP, HTTP, Overview of IP version 6.

UNIT-III

Local Area Networks: Introduction to LANs, Features of LANs, Components of LANs, Usage of LANs, LAN Standards, IEEE 802 standards, Channel Access Methods, Aloha, CSMA, CSMA/CD, Token Passing, Ethernet, Layer 2 & 3 switching, Fast Ethernet and Gigabit Ethernet, Token Ring, LAN interconnecting devices: Hubs, Switches, Bridges, Routers, Gateways.

UNIT-IV

Wide Area Networks: Introduction of WANs, Routing, Congestion Control, WAN Technologies, Distributed Queue Dual Bus (DQDB), Synchronous Digital Hierarchy (SDH)/ Synchronous Optical Network (SONET), Asynchronous Transfer Mode (ATM), Frame Relay, Wireless Links

I**ntroduction to Network Management:** Management, Class of Service, Quality Firewalls, VLANs, Proxy Servers.

Remote Monitoring Techniques: Polling, Traps, Performance of Service, Security management, Digital signatures, SSL

Text Book/ Reference Books:

1. **Computer Networks (3rd edition), Tanenbaum Andrew S., International edition, 1996.**
2. **Data Communications, Computer Networks and Open Systems (4th edition), Halsall Fred, 2000, Addison Wesley, Low Price Edition.**
3. **Business Data Communications, Fitzgerald Jerry, Computer Networks – A System Approach, Larry L. Peterson & Bruce S. Davie, 2nd Edition.**

Note:

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Course Outcomes:

After successful completion of the course, students will be able to:

1. Understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.
2. Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.
3. Design a network routing for IP networks.
4. Demonstrate proper placement of different layers of ISO model and illuminate its function and determine proper usage of the IP address, subnet mask and default gateway in a routed network.

CSE307C FORMAL LANGUAGES & AUTOMATA THEORY

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand the basic properties of formal languages and formal grammars
2. To understand the basic properties of deterministic and nondeterministic finite automata
3. To understand the basic properties of Turing machines and computing with Turing machines
4. To understand the concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problems

UNIT- I

Basic Computational Constructs : Finite State Systems, Basic Definitions Non-Deterministic finite automata (NDFA), Deterministic finite automata (DFA), Equivalence of DFA and NDFA Finite automata with E-moves, Regular Expressions, Equivalence of finite automata and Regular Expressions, Regular expression conversion and vice versa. Conversion of NFA to DFA by Arden's Method Concept of basic Machine, Properties and limitations of FSM, Moore and Mealy Machines, Equivalence of Moore and Mealy machines.

UNIT-II

Regular Sets& Grammars : The Pumping Lemma for Regular Sets, Applications of the pumping lemma, Closure properties of regular sets, Myhill-Nerode Theorem and minimization of finite Automata, Minimization Algorithm. Definition, Context free and Context sensitive grammar, Ambiguity regular grammar, Reduced forms, Removal of useless Symbols and unit production, Chomsky Normal Form (CNF), Griebach Normal Form (GNF).

UNIT-III

Pushdown Automata &Turing Machines: Introduction to Pushdown Machines, Applications of Pushdown Machines Deterministic and Non-Deterministic Turing Machines, Design of T.M, Halting problem of T.M., Post's Correspondence Problem.

UNIT-IV

Chomsky Hierarchies &Computability: Chomsky hierarchies of grammars, unrestricted grammars, Context sensitive languages, Relation between languages of classes Primitive Recursive Functions.

TEXT BOOK/ REFERENCE BOOKS:

1. **Introduction to automata theory, language & computations- Hopcroaft & O.D.Ullman, R Mothwani, Addison Wesley Publishers.**
2. **Theory of Computer Sc.(Automata, Languages and computation):K.L.P.Mishra& N.Chandrasekaran, 2000, PHI.**
3. **Introduction to formal Languages & Automata-Peter Linz, 2001, NarosaPubl.**
4. **Fundamentals of the Theory of Computation- Principles and Practice by RamondGreenlaw and H. James Hoover, 1998, Harcourt India Pvt. Ltd..**
5. **Elements of theory of Computation by H.R. Lewis & C.H. Papaditriou, 1998, PHI.**

6. **Introduction to languages and the Theory of Computation by John C. Martin 2012, T.M.H.**

Note:

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Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Master regular languages and finite automata.
2. Master Context-free languages, push-down automata, and Turing recognizable languages.
3. Understand the theoretical foundations of computer science.
4. Analytically and intuitively solve problems in related areas of theory in computer science.

CSE309C SOFTWARE ENGINEERING

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To enable students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.
2. To make students understand different phases to make a software & study them in detail.
3. To make students understand different testing techniques for different projects, making the students understand to develop quality software, its maintenance & software reliability.
4. To make students aware about the design models & its principles (data design, component design, interface design & architectural design).

UNIT- I

Introduction:- Evolving role of software, Software Characteristics, Software crisis, Software myths, Software process, Software development Models: Waterfall Model, Prototype Model, Spiral, Model, RAD Model, Iterative Model, Incremental Model, Aspect-oriented Model, **Agile Methodology:** Pair and mob programming, high performance teams with core protocols, test driven development, behaviour driven development, continuous delivery, clean code, refactoring, extreme programming, Scrum.

UNIT- II

Requirements, Analysis & Specification:- Software Requirements engineering, Requirement Engineering Process, Requirement Engineering Tasks, Types of requirements, SRS.

System Modeling:- Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling, The mechanics of structured analysis: Creating entity/ relationship diagram, data flow model, control flow model, the data dictionary.

UNIT- III

System Design:- Design principles, the design process; Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; Effective modular design: Functional independence, Cohesion, Coupling; Design Heuristics for effective modularity, Data Design, Architecture Design, Interface Design.

Software Testing And Maintenance:- Testing terminology: error, bug/defect/fault, failure, Verification and validation, Test case design, Static testing, Dynamic testing, Black box testing, Boundary value analysis, White box testing, basis path testing, Unit testing, Integration testing, Acceptance Testing, debugging, debugging process debugging approaches. Software maintenance categories, Models.

UNIT- IV

Software Quality Models And Standards:- Quality concepts, Software Quality Assurance, SQA activities, Formal approaches to SQA; Statistical software quality assurance; CMM, The ISO 9126 Standard, Configuration Management, Software reengineering, reverse engineering, restructuring, forward engineering,

Software Project Management:- Project management concepts, Planning the software project, Software Estimations, empirical estimation COCOMO, staffing, team structures, staffing, risk analysis and management..

TEXT/REFERENCES BOOK:

1. **Software Engineering – A Practitioner's Approach, Roger S. Pressman, 1996, MGH.**
2. **Fundamentals of software Engineering, Rajib Mall, PHI**

3. **Software Engineering by Ian sommerville, Pearson Edu., 5th edition, 1999,AW,**
4. **Software Engineering – David Gustafson, 2002, T.M.H**
5. **Software Engineering Fundamentals Oxford University, Ali Behforooz and Frederick J. Hudson1995, JW&S**
6. **An Integrated Approach to Software Engineering by Pankaj jalote, 1991, Narosa.**

Note:

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Course Outcomes:

After successful completion of the course, students will be able to:

1. Understand basic concepts of software engineering, implement Software life cycle models and have knowledge of different estimation models.
2. Understand requirement and modeling concepts in software development.
3. Understand the different design principles of a software project and prepare soft testing strategies.
4. Understand and incorporate the Software Quality standards and build a robust software

CSE381C OBJECT ORIENTED PROGRAMMING LAB

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To apply the basic knowledge of Object and classes.
2. To implement features of Object oriented programming like inheritance, polymorphism, operator overloading
3. To apply the concepts of exception handling and templates.

List of hands-on experiments related to the course contents of CSE301C.

1. Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power ( ) that takes a double value for n and an int value for p, and returns the result as double value Use a default argument of 2 for p. so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.
2. Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding. subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result.
3. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be 'Y' or 'N'. Some sample interaction with the program might look like this.
4. Enter first number. Operator, second number: 10/3 Answer = 3.333333
5. Do another (YI N)? Y Enter first number. Operator, second number 12 + 100 Answer = 11 Do another (Y I N)? N
6. Write a program to overload constructors.
7. Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe DM object or DB object. depending on the units in which the results are required. The display should be in the format of feet and inches or metres and centimetres depending on object on display.
8. Write a Program to overload +,-,*,/,+= on a class of complex numbers.
9. Write a Program to overload +,== on a class of strings.
10. Create a class rational which represents a numerical value by NUMERATOR & DENOMINATOR . Write a Program to overload +,- for class of rational .
11. Make a class Employee with a name and salary. Make a class Manager inherit from Employee. Add an instance variable, named department, of type string. Supply a method to toString that prints the manager's name, department and salary. Make a class Executive inherit from Manager Supply a method to String that prints the string Executive followed by the information stored in the Manager superclass object. Supply a test program that tests these classes and methods.
12. Imagine a tollbooth with a class called toll Booth. The two data items of a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor

initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ). increments the car.

13. Write a program to create a class template to implement stack operations.
14. Write a program to demonstrate exception handling.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Develop program using the concepts of object oriented programming like class, objects, constructors and destructors.
2. Develop programs using C++ features such as Operator overloading and
3. Develop programs to illustrate virtual functions and friend functions.
4. Develop programs to apply the concepts of templates and exception handling

CSE383C DATABASE MANAGEMENT SYSTEM LAB

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To have good knowledge of query formation using SQL.
2. To have knowledge of Storage and access techniques of Data from Database.
3. To be familiar with different functions used for data processing in DBMS

List of Experiments

1. To study Data Definition language
1.1. Create, alter, drop, truncate
1.2. To implement Constraints.
1.2.1. (a). Primary key, (b).Foreign Key, (c). Check, (d). Unique, (e). Null, (f). Not null , (g) . Default, (h). Enable Constraints, (i). Disable Constraints (j). Drop Constraints
2. To implementation on DML, TCL and DRL
2.1. (a).Insert, (b).Select, (c).Update, (d).Delete, (e).commit, (f).rollback,(g).save point, (h). Like'%', (i).Relational Operator (j) Logical operators
3. To implement Nested Queries & Join Queries
3.1. (a). To implementation of Nested Queries
3.2. (b). (a) Inner join, (b).Left join, (c).Right join (d).Full join(e) Natural Join (f) Theta Join (g) Cross Join
4. To implement Views
4.1. (a). View, (b).joint view, (c).force view, (d). View with check option
5. To implement Index
5.1 (a) Normal Index (b) Unique Index (c) Bitmap Index
(d) Composite (e) B-Tree (f) Clustered (g) Non- Clustered
6. To study various Date handling functions and their usage.
7. To Study String Handling Functions with Usage.
8.Case study of oracle 11g with emphasis on RECOVERY Techniques, Concurrency and Transaction Management.

Course Outcomes:

After successful completion of the course, students will be able:

1. To form queries using SQL.
2. To store and access data from database.
3. To use different data processing functions.

CSE385C PROFESSIONAL TRAINING(Level-2) Seminar

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits	Class Work	:	50 Marks
-	-	2	2	Total	:	50 Marks

Course Objectives:

1. Acquire knowledge of the industry in which the internship is done.
2. Apply knowledge and skills learned in the classroom in a work setting.
3. To decide the future application areas of Computer Science and Engineering.

At the end of 4th semester each student would undergo four weeks Professional Training in an Industry/ institute/ Professional / Organization/ Research Laboratory etc. with the prior approval. The student has to submit a typed report in the department along with a certificate from the organization. The typed report should be in a prescribed format.

The report will be evaluated in the 5th Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning. Teachers associated with evaluation work will be assigned 2 periods per week load.

Course Outcomes:

After completing the course the students will have:

1. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. An ability to work in a multidisciplinary team
3. An ability to identify, formulate, and solve engineering problems
4. An understanding of professional and ethical responsibility.

Program Elective – I

CSE321C COMPUTER GRAPHICS

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	3	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To list the basics concepts used in computer graphics.
2. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.
3. To describe the importance of viewing and projections.
4. To design an application with the principles of virtual reality and understand a typical image processing.

Unit-I

Introduction to Computer Graphics: What is Computer Graphics, Computer Graphics Applications, Computer Graphics Hardware and software, Two dimensional Graphics Primitives: Points and Lines, Line drawing algorithms: DDA, Bresenham's; Circle drawing algorithms: Using polar coordinates, Bresenham's circle drawing, mid point circle drawing algorithm; Filled area algorithms: Scanline: Polygon filling algorithm, boundary filled algorithm.

Unit-II

Two/Three Dimensional Viewing: The 2-D viewing pipeline, windows, viewports, window to view port mapping; Clipping: point, clipping line (algorithms):- 4 bit code algorithm, Sutherland-cohen algorithm, parametric line clipping algorithm (Cyrus Beck).

Polygon clipping algorithm: Sutherland-Hodgeman polygon clipping algorithm. Two dimensional transformations: transformations, translation, scaling, rotation, reflection, composite transformation.

Three dimensional transformations: Three dimensional graphics concept, Matrix representation of 3-D Transformations, Composition of 3-D transformation.

Unit-III

Viewing in 3D: Projections, types of projections, the mathematics of planner geometric projections, coordinate systems.

Hidden surface removal: Introduction to hidden surface removal .Z- buffer algorithm , scanline algorithm, area sub-division algorithm.

Unit-IV

Representing Curves and Surfaces: Parametric representation of curves: Bezier curves, B-Spline curves. Parametric representation of surfaces; Interpolation method.

Illumination, shading, image manipulation: Illumination models, shading models for polygons, shadows, transparency. What is an image? Filtering, image processing, geometric transformation of images.

TEXT/REFERENCE BOOKS:

1. Computer Graphics Principles and Practices second edition by James D. Foley, Andeies van Dam, Stevan K. Feiner and Johb F. Hughes, 2000, Addision Wesley.
2. Computer Graphics by Donald Hearn and M.Pauline Baker, 2nd Edition, 1999, PHI.
3. Procedural Elements for Computer Graphics – David F. Rogers, 2001, T.M.H Second Edition

4. Fundamentals of 3Dimensional Computer Graphics by Alan Watt, 1999, Addision Wesley.
5. Computer Graphics: Secrets and Solutions by Corrign John, BPB
6. Graphics, GUI, Games & Multimedia Projects in C by Pilania & Mahendra, Standard Publ.
7. Computer Graphics Secrets and solutions by Corrign John, 1994, BPV
8. Introduction to Computer Graphics By N. Krishanmurthy T.M.H 2002

Note:

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Course Outcomes:

After completing the course the student will be able to:

1. Understand the basics concepts used in computer graphics.
2. Implement various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.
3. Understand the importance of viewing and projections.
4. Design an application with the principles of virtual reality and understand a typical image processing.

CSE323C PROGRAMMING LANGUAGES

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	3	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To understand the issues involved in programming language design and implementation.
2. To have an in-depth understanding of functional, logic, and object-oriented programming paradigms.
3. Understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing.
4. To develop an understanding of the compilation and storage process.

Unit-I

Introduction: Syntactic and semantic rules of a Programming language, Characteristics of a good programming language, Programming language translators compiler & interpreters , Virtual Computers & Binding times; Introduction to procedural, non-procedural ,structured, functional and object oriented programming language, Comparison of C & C++ programming languages.

Unit-II

Elementary & Structured Data Types : Elementary data types – data objects, variable & constants, data types, Specification & implementation of elementary data types, Declarations ,type checking & type conversions , Assignment & initialization, Numeric data types, enumerations, Booleans & characters Structured data types& data Objects , specification & implementation of structured data types, Declaration & type checking of data structure ,vector & arrays, records Character strings, variable size data structures , Union, pointer & programmer defined data objects, sets, files.

Unit–III

Sequence Control& Data Control: Implicit & explicit sequence control ,sequence control within expressions, sequence control within statement, Subprogram sequence control: simple call return ,recursive subprograms, Exception & exception handlers, co routines, sequence control .

Data Control:-Names & referencing environment, static & dynamic scope, block structure, Local data & local referencing environment, Shared data (dynamic & static scope) ; Parameters& parameter transmission schemes.

Unit-IV

Storage Management& other features: Major run time elements requiring storage, programmer and system controlled storage management & phases, Static storage management, Stack based storage management, Heap storage management, variable & fixed size elements. Evolution of data type concept, abstraction, encapsulation & information hiding, Subprograms, type definitions, abstract data types

TEXT/REFERENCE BOOKS:

1. **P**rogramming languages Design & implementation by T.W. .Pratt, 1996, Prentice Hall Pub.
2. Programming Languages – Principles and Paradigms by Allen Tucker & Robert Noonan, 2002, TMH.
3. Fundamentals of Programming languages by Ellis Horowitz, 1984, Galgotia publications (Springer Verlag),
4. Programming languages concepts by C. Ghezzi, 1989, Wiley Publications.
5. Programming Languages – Principles and Pradigms, Allen Tucker, Robert Noonan 2002, T.M.H.

Note:

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Course Outcomes:

After completing the course the student will be able to:

1. Understand the concepts involved in programming language design and implementation.
2. Understand the functional, logic, and object-oriented programming paradigms.
3. Understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing.
4. Understand the compilation and storage process.

CSE325C WIRELESS COMMUNICATION

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To know about the evolution of wireless communication systems and various generations of cellular systems.
2. To understand the basic design principles of cellular systems.
3. To understand the advanced multiple access techniques.
4. To understand the diverse reception techniques and applications of cellular networks.

UNIT 1:

INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS: Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems.

MODERN WIRELESS COMMUNICATION SYSTEMS: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks.

UNIT 2:

INTRODUCTION TO CELLULAR MOBILE SYSTEMS: Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems.

CELLULAR SYSTEM DESIGN FUNDAMENTALS: Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and trade off service, improving coverage and capacity.

UNIT 3:

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.

UNIT 4:

WIRELESS NETWORKING: Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent network**.**

INTELLIGENT CELL CONCEPT AND APPLICATION: Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.

TEXT/REFERENCE BOOKS:

1. Wireless Communications: Theodore S. Rappaport; Pearsons.
2. Mobile Cellular Telecommunication: W.C.Y.Lee; McGraw Hill
3. Mobile Communications: Jochen Schiller; Pearson

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes

After completing the course the student will be able to

1. Understand the evolution of wireless communication systems and various generations of cellular systems.
2. Understand the basic design principles of cellular systems.
3. Understand the advanced multiple access techniques.
4. Understand the diverse reception techniques and applications of cellular networks.

CSEH301C NETWORK SECURITY AND CRYPTOGRAPHY

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To understand cryptography theories; algorithms & systems.
2. To understand the symmetric and asymmetric key algorithms.
3. To understand necessary approaches & techniques to build protection mechanisms in order to secure Computer Networks.
4. Acquire fundamental knowledge on the concepts of different security layers.

UNIT- I

Introduction: Plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography.

UNIT- II

Symmetric Key Algorithms:- Introduction, algorithms types and modes, DES, AES.

Asymmetric Key Algorithms: Introduction, history of asymmetric key cryptography, RSA symmetric and asymmetric key cryptography together, Digital signature.

UNIT- III

Internet Security Protocols: Basic concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), S SL versus SET, Electronic Money, Email Security.

UNIT- IV

User Authentication And Kerberos:- Introduction, Authentication basics, Passwords, authentication tokens, certificate based authentication, biometric based authentication, Kerberos, key distribution center(KDC), Security handshake pitfalls, single Sign on(SSO) approach.

TEXT/ REFERENCE BOOKS:

1. **Cryptography and Network Security, 2nd Edition by Atul Kahate, TMH**
2. **Network Management Principles & Practices by Subramanian, Mani (AWL)**
3. **SNMP, Stalling, Willian (AWL)**
4. **SNMP: A Guide to Network Management (MGH)**
5. **Telecom Network Management by H.H. Wang (MGH)**
6. **Network Management by U. Dlack (MGH)**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

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Course Outcomes:

After completing the course the student will be able to

1. Compare various cryptographic techniques.
2. Work with symmetric & asymmetric key algorithms.
3. Design secure applications.
4. Inject secure coding in the developed applications.

CSEH303C INTRODUCTION TO DATA SCIENCE

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Course Objectives:

1. To understand the basic concepts of Data science and data pre-processing
2. To analyze data using Statistics and Probability techniques
3. To understand the basic concepts of clustering and classification techniques
4. To understand of the key techniques and theory used in visualization, including data models, graphical perception and techniques for visual encoding and interaction.

UNIT- I

Introduction:- Benefits and uses of data science and big data , Facets of data , Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management , data science process, Data pre-processing: Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization , Data science toolkit.

UNIT- II

Data analysis:- Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT Probability: Random experiments, trial, sample space, events. Approaches to probability - classical, empirical, subjective and axiomatic. Theorems on probabilities of events. Addition rules of probability. Conditional probability, independence of events and multiplication rule of probability.

UNIT- III

Classification:- Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy, Support Vector Machines, Lazy Learners (or Learning from Your Neighbors)

Cluster Analysis:- Basic Concept and Methods Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering, Clustering High-Dimensional Data, Clustering Graph and Network Data.

UNIT- IV

Data visualization:- Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

TEXT/ REFERENCE BOOKS:

1. **Davy Cielen Arno D. B. Meysman Mohamed Ali "Introducing data Science, "**
2. **Rachel Schutt and Cathy O'Neil, "Doing Data Science"**
3. **Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to DataMining", Person Education, 2007.**
4. **K.P. Soman, Shyam Diwakar and V. Ajay,"Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2016.**
5. **Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.**

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Course Outcomes:
After completing the course the student will be able to

1. Perform the pre-processing of data and apply mining techniques on it.
2. Analyze data using data using Statistics and Probability techniques
3. Perform clustering and classification techniques
4. Present analyzed data using visualization tools

CSEH381C NETWORK SECURITY AND CRYPTOGRAPHY LAB

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
-	-	4	2	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
2. To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
3. To familiarize symmetric and asymmetric cryptography
4. Design secure applications

Lab Exercises to be given by the concerned faculty based on the subject CSEH301C Network Security and Cryptography

COURSE OUTCOMES:

At the end of this course students will be able to:

1. Identify basic security attacks and services
2. Use symmetric and asymmetric key algorithms for cryptography
3. Make use of Authentication functions.
4. Design secure applications

CSEH383C PYTHON FOR DATA SCIENCE LAB

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
-	-	4	2	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. Implementation of basic constructs of Python programming language.
2. Familiarize with the strings and inbuilt functions.
3. Retrieval operations on data using lists, dictionaries, tuples and sets.
4. Learning the usage of regular expressions and built-in functions to navigate the file system.
5. To implement Object-oriented Programming concepts in Python.

The students should do the following:

1. Application of various control flow constructs
2. To learn application of various string handling functions.
3. Introduction Regular expression with operations
4. Implantation of List and various operations on it .
5. Implementation of Array & its operations using Numpy package.
6. Implementation of Dictionary with operations.
7. Implementation of User Defined functions in Python
8. Implementation of Exception Handling concepts
9. Implementation of File handling operations
10. Implementation of object oriented features: Class & Instances
11. Introduction to Series in Python Pandas library
12. Introduction to Dataframes with basic operations.

Text / Reference Books

1. **Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press, Taylor & Francis, 2018. ISBN-13: 978-0815394372**
2. **Chun, J Wesley, Core Python Programming, Second Edition, Pearson, 2007 Reprint 2010.**
3. **Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058**
4. **Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365**
5. **Miguel Grinberg, "Flask Web Development: Developing Web Applications with Python", 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732**

Course Outcomes:

At the end of this course students will be able to:

1. Implement constructs, strings and inbuilt functions in Python.
2. Retrieve data using lists, dictionaries, tuples and sets.
3. Navigate file system using regular expression and built in functions.
4. Use Object-oriented Programming concepts in Python

CSE302C COMPILER DESIGN

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. Apply the knowledge of lex tool & yacc tool to develop a scanner & parser.
2. Design and conduct experiments for Intermediate Code Generation in compiler.
3. Develop program to solve complex problems in compiler
4. Learn the new code optimization techniques to improve the performance of a program in terms of speed and space.

UNIT-I

Introduction: Compilers and translators need of translators, structure of compiler: its different phases, Compiler construction tools**.**

Lexical Analysis: Role of lexical analyzer; Design of lexical analyzer; Regular expressions ;Specification and recognition of tokens; Input buffering; Finite automata; Conversion from regular expression to finite automata, and vice versa; Minimizing the number of states of DFA, Implementation of lexical analyzer.

UNIT-II

Syntactic Techniques & Parsing: Context free Grammars; Derivations & parse trees; Capabilities of CFGs; Role of parsers, Shift- Reduce Parsing ; Operator precedence parsing; top down parsing; predictive parsing, LR parsers; LR(0) items SLR, LALR and Canonical LR parser.

UNIT-III

Syntax Directed Translation , Symbol Table & Error Handling : Syntax directed definition, construction of syntax trees, syntax directed translation scheme, implementation of syntax directed translation, Intermediate Code ;Parse trees & Syntax trees; Three address code, quadruples and triples; Translation of Boolean Expressions. Symbol tables, its contents and data structure for symbol tables; trees, arrays, linked lists, hash tables ; Operations on symbol table; Errors(lexical phase error, syntactic phase error, semantic error).

UNIT-IV

Code Optimization & Code Generation: Sources of code optimization; Loop optimization (Denominators, Reducible flow graphs, depth first search, loop invariant computation, Induction variable elimination) ; Directed acyclic representation of basic blocks Code generation, forms of objects code, machine dependent code, register allocation for temporary and user defined variables; Problems in code generation; Peephole optimization.

TEXT / REFERENCE BOOKS:

1. **Compilers Principle, Techniques & Tools - Alfread V. AHO, Ravi Sethi& J.D. Ullman; - 1998Addison Wesley.**
2. **Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc. Graw Hill.**
3. **System Software by Dhamdhare, 1986, MGH.**
4. **Principles of Compiler Design, Alfred V Aho , Jeffery D. Ullman , Narosa Publication**

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Course Outcomes:

1. Students will get the concepts of Compilers and the actual roles of the lexical analyzer
2. Students will get the concepts of different Parsing techniques and Construction of syntax trees
3. Students will get the concepts of Type checking and Run time environments
4. Students will get the concepts of Intermediate code generation, Code optimization and Code generations.

CSE324C MOBILE APPLICATIONS DEVELOPMENT

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To understand the basics of mobile computing devices and applications types.
2. To understand the mobile communication mechanisms.
3. To understand the communication mechanisms via Web
4. To understand the designing mechanisms of mobile applications for different platforms.

UNIT-I

Introduction to Mobile Application Development: Definition of mobile computing, various types of mobile computing devices (mobile computers, smart phones and dedicated devices). Web based applications, Native applications and Compare and contrast web-based mobile applications against native applications, history of mobile platforms (PDA's, Notebooks, Smartphones. Internet protocols for mobile applications i.e. WAP), evolution of browsers and Internet languages such as HTML and JavaScript.

UNIT-II

Infrastructure: Describe mobile and cell phone technologies (CDMA, GSM, 3G, 4G), Compare and contrast 3G and 4G, Internet terms: IP address, subnet mask, gateway, DNS, static vs Dynamic IP, transport including HTTP, routing, secure connections, proxies and reverse proxies. Need for storage, local Storage, storage on Web.

UNIT-III

HTML/CSS/DOM and Scripting: Basic HTML: validation, rendering and web browser, Cascading Style Sheets (CSS) and how to use them, document object model (DOM): document, objects, model, DOM tree and DOM's utilization in web design, basic JavaScript code and constructs of the JavaScript language.

UNIT-IV

Designing mobile user interfaces and Mobile Platforms: Design mobile interfaces, usability, ways to test user interfaces, various types of user interfaces for mobile apps: Interactive voice response (IVR), SMS/MMS, Mobile web, Native applications, Hybrids, mobile application development design considerations: Text entry, screen size, user interface and user context. Mobile Platforms: URIs for mobile apps, Compare and contrast native mobile platforms such as tightly controlled (IPhone), open (Android), and licensed (Windows Mobile), web as a mobile application platform.

Text Book:

Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

Reference Books:

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd (2011)
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd(2009)
3. Sayed Y Hashimi and Satya Komatineni, "Pro Android", Wiley India Pvt Ltd(2009)

4. Brian Fling, "Mobile Design and Development: Practical concepts and techniques for creating mobile sites and web

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Course Outcomes:

After completing the course the student will be able to:

1. Have an understanding of mobile computing devices and applications types for designing the simple mobile applications.
2. Have an ability to identify the need of mobile communication mechanisms.
3. Have an understanding of communication mechanisms via Web
4. Have the knowledge for designing mechanisms of mobile applications for different platforms.

CSE326C DIGITAL IMAGE PROCESSING

B. Tech. Semester – V (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Course Objectives:

1. To learn and understand the fundamentals of digital image processing.
2. To learn and understand various image Transforms.
3. To learn and understand Image Enhancement Techniques.
4. To learn image restoration Techniques and methods, image compression and Segmentation used in digital image processing.

UNIT- I

Digital Image Fundamental: - Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

UNIT- II

Image Enhancements, Filtering And Restoration:- Enhancement in spatial domain; pixel grey level transformation, image negatives, logarithmic transformation; bit-plane slicing, histogram processing; enhancement in frequency domain; image smoothing (low pass filter), image sharpening (high pass filter), selective filtering (band pass and band reject filters); noise models for images, signal-to-noise ratio, image restoration in the presence of noise using spatial filtering, periodic noise reduction by frequency domain filtering; estimating the degradation function, inverse filtering.

UNIT- III

Color Image Processing & Image Segmentation:- Color fundamentals, color models, RGB, CMY and CMYK color models, HSI model; pseudocolor image processing, basics of full color processing, color transformations, smoothing and sharpening; noise in color images, grey level to color transformation; Image Segmentation: fundamentals, edge-based segmentation; image thresholding, intensity thresholding; basic global thresholding, multi-variable thresholding.

UNIT- IV

Image Compression:- Redundancy–inter-pixel and psycho-visual; Loss less compression – predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.

TEXT AND REFERENCE BOOKS:

1. **R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008.**
2. **Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004.**
3. **Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015.**

Note:

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Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Represent various types of images and analyze them.
2. Process these images for the enhancement of certain properties or for optimized use of the resources.
3. Work with colored images and perform image segmentation.
4. Develop algorithms for image compression and coding.

CSE328C ADVANCED JAVA

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To study the fundamental concepts of programming in Java including the designing of interactive applications.
2. To learn the concepts of connecting with databases.
3. To gain the insights of servlet concept.
4. To understand the fundamental concepts of JSP.

UNIT-I

Introduction: Concepts of Classes and Objects, Constructors, Inheritance, Function Overloading, Polymorphism, Packages and Interfaces, exception handling, file streams and their manipulation. AWT & Applet Programming Design of User Interfaces: Swing, Japplet, Icons and Labels, Text Fields, Buttons, Jbutton Class, Check Box, Radio Buttons, The Container, Panel, Windows, and Frame Classes, Combo Box, Tabbed Panes, Scroll Panes, Trees, Tables, Custom Rendering of Jlist Cells.

UNIT-II

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, working with statements, Creating and Executing SQL statements, working with Result Set Object & Result Set Meta Data. Java Beans: Java Bean, Installing, Starting Bean Development Kit, Use of JAR files and the use of Java Beans API.

UNIT-III

Servlets: Introduction to Servlets, Life cycle of Servlets, Creating, Compiling and running servlet, Reading the servlet Parameters, Reading Initialization parameter, Packages- javax.servletPackage, Handling HTTP Request and Response (GET / POST Request), Cookies and Session Tracking.

UNIT-IV

JSP: JSP Architecture, JSP Access Mode, JSP Syntax Basic (Directions, Declarations, Expression, Scriplets and Comments, JSP Implicit Object, Object Scope, Synchronization Issue, Session Management.

Text/Reference Books:

1. **Gary Cornell and Horstmann Cay S., Core Java, Vol I and Vol II, Sun Microsystems Press.**
2. **Herbert Schildt, Java: The Complete Reference, McGraw-Hill.**
3. **Philip Hanna, JSP: The Complete Reference, McGraw-Hill.**
4. **Deital and Deital, Java How to Program, Prentice Hall (2007).**

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Course Outcomes:

1. Have an ability to apply the core Java concepts for designing applications.
2. Have an ability to use the Java concepts for accessing a database.
3. Have an ability to understand the utility of server side technologies.
4. Have basic understanding and knowledge of JSP.

CSE330C IoT ARCHITECTURE & PROTOCOLS

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To understand the basics of IoT.
2. To learn IoT Architecture and enabling technologies
3. To know about IoT protocols at different layers
4. To know about the application areas of IoT

UNIT- I

Introduction to IoT:-

Introduction to IoT, Market Trends, Opportunities in IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT: Functional blocks of IoT, Difference between IoT and M2M, Software defined Network(SDN) for IoT, Network Function Virtualization(NFV) for IoT, Data Handling and Analytics, Challenges in IoT(Design, Development, Security). An IoT Security Framework,SDN and NFV over IoT Deployment , IoT entities---Sensors,actuators,gateway,cloud,Mobile/web apps.

UNIT- II

IOT Architecture And enabling technologies-

IoT Architecture:- IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations, IoT communication Architecture, IoT Communication models & APIs, Reference Model- IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, SOA based Architecture, API-based Architecture, OPENIoT Architecture for IoT/Cloud Convergence..

IOT Enabling Technologies:-

Introduction to Big Data Analytic, Embedded Systems, Cloud Computing-Cloud Service Management and IOT - Connecting IOT to cloud – Cloud Storage for Iot ,Wireless Sensor Networks-Industrial sensors, Integrated IoT Sensors, Sensors' Swarm

UNIT- III

IoT protocols:-Wireless communication protocols: Wifi, IPV4/IPV6, 6LOWPAN, ZigBee(IEEE802.15.4), Bluetooth, Bluetooth Low Energy(BLE)

Application layer protocols: MQTT/MQTTS, CoAP, REST/HTTP,XMPP,SCADA Authentication Protocols; IEEE 802.15.4., comparison of the different IoT protocols, advantages and disadvantages (limitations) of these IoT protocols.

UNIT- IV

Applications of IoT And Research Perspective:- IoT Strategic Research and Innovation Directions , Domain specific applications of IoT, Home automation, Surveillance applications, Industrial IoT,IoT in Energy, IoT in Healthcare, Internet of Robotic Things, Green IoT, home, infrastructures, buildings, security, Industries, Home appliances,Internet of Nano Things,IoT application in Drones, Internet of Vehicles(IoV),Internet of Everything(IoE)

TEXT/REFERENCES:

1. **Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-OnApproach"**
2. **Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory andPractice"**
3. **Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493- 9357-1.**
4. **David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017**
5. **Hersent, Olivier, David Boswarthick, and Omar Elloumi. The internet of things: Key applications and protocols. John Wiley & Sons, 2011.**
6. **Buyya, Rajkumar, and Amir Vahid Dastjerdi, eds. Internet of Things: Principles and paradigms. Elsevier, 2016.**
7. **Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, 'Technologies & Sensors for the Internet of Things Businesses & Market Trends 2014 - 2024',Yole Développement Copyrights ,2014**
8. **Editors OvidiuVermesan Peter Friess,'Internet of Things – From Research and Innovation to Market 4. 4.Deployment', River Publishers, 2014**

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Course Outcomes:

On successful completion of the course, the student will:

1. Comprehend the essentials of IoT
2. Understand IoT Architecture & enabling technologies
3. Understand various IoT protocols
4. Understand IoT applications in different domain and be able to analyze their performance.

CSEH306C INFORMATION SECURITY AND DATA HIDING

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To learn about data hiding applications and their techniques.
2. To learn about hacking.
3. To learn security based protocols, attacks and intrusions.
4. To work with advance data hiding techniques.

UNIT- I

Introduction: - The need for security, security approach, principles of security, types of attack, denial of service, IP spoofing, Phishing. Digital signature, Firewall.

UNIT- II

Hacking:- Basics, Email hacking, computer hacking, types of hacking, practice against hacking, Access Authorization, Compression, LZW Compression and Decompression Method.

UNIT- III

Data hiding:- Terms related to data hiding, Differences between cryptography, stenography & watermarking, history of stenography. Applications of data hiding.

UNIT- IV

Advance data hiding techniques :- Transform domain, difference between special domains and transform domain, wavelets, advantages of wavelet, and wavelet based techniques for data hidings.

TEXT REFERENCE BOOKS:

1. **Cryptography and Network Security by Atul Khat e, Mc Graw Hill Publisher**
2. **E-mail Hacking by Ankit Fadia, Vikash Publishers**
3. **Data communication and Networking , Behrouz A. Forouzan .**

Note:

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Course Outcomes:

After completing the course the student will be able to:

1. Explain information security.
2. Give an overview of access control of relational databases.

3. State the basic concept in information systems security, including security technology and principles, software security and trusted systems and IT security management.
4. Learn advance data hiding techniques.

CSEH310C DATA ANALYTICS WITH PYTHON

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To get the students familiar about the Concepts of Descriptive Statics through tests.
2. To study the concepts of Inferential Statistics and ANOVA.
3. To study in detail the techniques and history of Data Visualization.
4. To study the basic and concepts of Big Data Analytics, Data Mining and Clustering.

UNIT-I

Descriptive Statistics:- Statistical Analysis of Data, Descriptive Statistics, Frequency Distributions, Histograms, Histograms, Shapes of Distributions, Measures of Central Tendency Computing the Mean, Measuring Variability, Measures of Relationship, Reliability Indices, Standard Scores (Z-scores),Inferential Statistics, Populations and Samples, Sampling Techniques.

UNIT-II

Inferential Statistics:- Hypothesis testing, chi square test and T-test, Statistical decisions, Statistical decision process, Testing for mean differences, statistical versus practical significance, Effect of sample size, Regression (single).

UNIT-III

Data Visualization:- Data Visualization: Meaning and significance, Traits of Meaningfull Data, Brief History of Information Visualization, Power of visual perception, Making abstract data Visible, Building Blocks of information Visualization, Analytical Techniques.

UNIT-IV

Big Data, Data Mining & Clustering:- Big Data, In-memory processing, limitations of In-memory processing, Data mining process along-with techniques, Tools and platforms for data mining, Clustering and its techniques (K-means, Agglomerative, Hierarchical clustering, and DBSCAN).

TEXT/ REFERENCES BOOKS:

1. **Prem S. Mann, "Introductory Statics," Wiley.**
2. **Anil Maheshwari, "Data Analytics," Mcgraw Hill.**
3. **Hastie, Trevor et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.**
4. **Montgomery, Douglas C., and George C. Runger, "Applied statistics and probability for engineers" John Wiley & Sons,2010.**
5. **Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.**
6. **Pang-Ning Tan et al, "Introduction to Data Mining," Pearson.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

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Course Outcomes:

After completion of the course:

1. Students will be able to understand the Statistical analysis methods.
2. Students will be able to understand the Inferential Statistics and ANOVA.
3. Students will be able to understand the details of Data Visualization.
4. Students will be able to understand the concepts of Big Data Analytics, Data Mining and Clustering.

CSE340C ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand the basic concepts of AI and problem solving
2. To analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search techniques to solve them
3. To represent knowledge and draw inferences
4. To explore learning techniques and existing expert systems

UNIT- I

Introduction: The AI problems; what is an AI technique; Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving; Production systems; Control strategies: forward and backward chaining Exhaustive searches: Depth first Breadth first search.

UNIT- II

Heuristic Search Techniques: Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/OR Graphs; Problem reduction and AO* algorithm; Constraint Satisfaction problems Game Playing Minmax search procedure; Alpha-Beta cutoffs; Additional Refinements

UNIT- III

Knowledge Representation & Reasoning:- Propositional logic, First order predicate logic, Inference in FOPL, Skolemnisation; Resolution Principle and Unification; Forward & Backward chaining, Inference Mechanisms Horn's Clauses; Semantic Networks; Frame Systems and Value Inheritance; Conceptual Dependency

UNIT- IV

Learning Techniques: - Supervised and unsupervised learning, Decision trees, Statistical learning models, Reinforcement learning.

Expert Systems: Introduction to Expert Systems, Architecture of Expert Systems; Expert System Shells; Knowledge Acquisition; Case Studies: MYCIN, Learning, Rote Learning; Learning by Induction; Explanation based
learning.

TEXT/REFERENCES BOOKS:

1. Elaine Rich and Kevin Knight: Artificial Intelligence- Tata McGraw Hill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems- Prentice Hall of India.
3. Nils J.Nilsson: Principles of Artificial Intelligence- Narosa Publishing house.
4. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norvig, Pearson Education
5. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After completion of course, students would be able to:

1.Analyze and formalize problem and solve them using AI techniques
2.Use Heuristic search techniques for game playing and other problems
3.Represent diverse knowledge using AI and analyze
4.Understand and design an expert system

CSE342C ADVANCED COMPUTER NETWORKS

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To educate concepts, vocabulary and techniques currently used in the area of computer networks.
2. To master the terminology and concepts of socket programming.
3. To be familiar with wireless networking concepts
4. To be familiar with contemporary security issues in networking technologies.

UNIT-I

Binding Protocol Address: Address Resolution Protocol & RARP, ARP & RARP, packet format, Encapsulation. Internet protocol: Introduction, Ipv4 header, Ipv4Datagrams, Encapsulation, Fragmentation and Reassembly, IP routing, Subnet addressing, Subnet mask, Supernetting-special case of IP addresses IPv6-Motivation, frame format and addressing, comparison of IPv4 and IPv6.

UNIT-II

Socket Programming: Creating sockets, Posix data type, Socket addresses, Assigning address to a socket, Java socket programming, Thread programming, Berkeley Sockets: Overview, socket address structures, byte manipulation & address conversion functions, elementary socket system calls –socket, connect, bind, listen, accept, fork, exec, close, TCP ports (ephemeral, reserved), Berkeley Sockets: I/O asynchronous & multiplexing models, select & poll functions, signal & fcntl functions, socket implementation (client & server programs), UNIX domain protocols.

UNIT-III

GSM Overview, GSM Network signaling, GSM Mobility Management, GSM Short Message Service, Mobile Number portability General Packet Radio Service: Functional Groups, Architecture, GPRS Network nodes and Interfaces, Introductory ideas about WAP.

UNIT-IV

Network Security Practice: Authentication Applications- Kerberos, X.509 Authentication Service; Electronic Mail Security-Pretty Good Privacy, S/MIME; IP Security- IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations; Web Security- Web Security Considerations, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

TEXT/REFERENCE BOOKS

1. Jawin, "Networks Protocols Handbook", Jawin Technologies Inc., 2005.
2. Bruce Potter and Bob Fleck, "802.11 Security", O'Reilly Publications, 2002.
3. Ralph Oppliger "SSL and TSL: Theory and Practice", Arttech House, 2009.
4. Forouzen, Data Communication and Networking, TMH
5. Behrouz A.Forouzan, TCP/IP Protocol Suite
6. William Stalling, Network Security Essentials, 2nd Edition. PHI New Delhi

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:
After completing the course the student will be able to:

1. Have an understanding of the concepts, vocabulary and techniques currently used in the area of computer networks.
2. Have an ability of terminologies and concepts of socket programming.
3. Have knowledge of wireless networking concepts.
4. Have the understanding of contemporary security issues in networking technologies.

CSE344C SOFTWARE TESTING

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
3. To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
4. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

UNIT- I

Introduction:- What is software testing and why it is so hard?, Error, Fault, Failure, Incident, Test Cases, Testing Process, Limitations of Testing, No absolute proof of correctness, Overview of Graph Theory.

Functional Testing:- Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

UNIT- II

Structural Testing:- Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

Testing Activities:- Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, DomainTesting.

UNIT- III

Reducing the number of test cases:- Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, and Slice based testing.

Object Oriented Testing:- Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing.

UNIT- IV

Testing Tools: Static Testing Tools, Dynamic Testing Tools, and Characteristics of Modern Tools and Implementation with example. Advanced topics in software testing: web based testing, Client server testing, Automated test cases generation, Regular expression and FSM based testing.

TEXT/ REFERENCE BOOKS:

1. **William Perry, Effective Methods for Software Testing , John Wiley & Sons, New York, 1995.**
2. **Cem Kaner, Jack Falk, Nguyen Quoc, Testing Computer Software , Second Edition, Van Nostrand Reinhold, New York, 1993.**

3. **Boris Beizer, Software Testing Techniques , Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.**
4. **Louise Tamres, Software Testing , Pearson Education Asia, 2002**
5. **Roger S. Pressman, Software Engineering – A Practitioner's Approach , Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.**
6. **Boris Beizer, Black-Box Testing – Techniques for Functional Testing of Software and Systems , John Wiley & Sons Inc., New York, 1995.**
7. **K.K. Aggarwal & Yogesh Singh, Software Engineering , New Age International Publishers, New Delhi, 2003.**
8. **Marc Roper, Software Testing , McGraw-Hill Book Co., London, 1994.**
9. **Gordon Schulmeyer, Zero Defect Software , McGraw-Hill, New York, 1990.**
10. **Watts Humphrey, Managing the Software Process , Addison Wesley Pub. Co. Inc., Massachusetts, 1989.**

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Course Outcomes:

After completing the course the student will be able to:

1. Have an ability to apply software testing knowledge and engineering methods and design and conduct a software test process for a software testing project.
2. Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.
3. Have an ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
4. Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems

CSEH304C FOUNDATIONS OF BLOCKCHAIN TECHNOLOGY

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To introduce basic concepts of Blockchain.
2. To understand abstract models for Blockchain technology
3. To learn about usage of Blockchain technology in financial services.
4. To visualize the scope of blockchain & its role in futuristic development.

Introduction to Blockchain:- Overview of blockchain, need for blockchain, history of centralized services, trusted third party, Distributed consensus in open environments, Distributed Vs Decentralized Network, 51 % attack theory, Public blockchains, Private blockchains, Blockchain Architecture and working, Mining, Limitations of blockchain, Applications of blockchain

UNIT- II

Models for blockchain:- GARAY model, RLA Model, Proof of Work (PoW), HashcashPoW, PoW Attacks and the monopoly problem, Proof of Stake(PoS), hybrid models(PoW+PoS), Proof of Burn and Proof of Elapsed Time.

UNIT- III

Permissioned Blockchain:- Permissioned model and use cases, Design issues for Permissioned blockchains, State machine replication, Consensus models for permissioned blockchain, Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

UNIT- IV

Blockchain in Financial Service:- Digital Currency, Cross border payments, Steller and Ripple protocols, Project Ubin, Know Your Customer (KYC), Privacy Consents, Mortgage over Blockchain, Blockchain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Insurance.

Blockchain Security: Security properties, Security considerations for Blockchain, Intel SGX, Identities and Policies, Membership and Access Control, Blockchain Crypto Service Providers, Privacy in a Blockchain System, Privacy through Fabric Channels, Smart Contract Confidentiality.

TEXT/REFERENCES BOOKS:

1. **Blockchain: Blueprint for a New Economy, by Melanie Swan.**
2. **Blockchain: The blockchain for beginners guide to blockchain technology and leveraging blockchain programming, by Josh Thompsons**
3. **Blockchain Basics by Daniel Drescher, Apress**

Note:

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Course Outcomes:

At the end of the course, students will develop understanding for:

1. Recognizing goals of Blockchain.
2. Smart Contracts, transactions in Blockchain and Permissioned Blockchain.
3. Analyzing usage of Blockchain in finance.
4. Security issues in Blockchain.

CSEH302C CRYPTOCURRENCY WITH ETHEREUM

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To introduce the concepts of cryptocurrency.
2. To understand working of Bitcoin and Ethereum
3. To study the security issues and safeguards related to bitcoin trading
4. To study governing cryptocurrency regulations and its impact on economy.

UNIT- I

Cryptocurrency:- History, Distributed Ledger Technology (DLT), cryptocurrency in blockchain, Cryptographic basics for cryptocurrency: overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography

UNIT- II

Bitcoin:- Creation of coins, Wallet, Genesis Block, Merkel Tree, Bitcoin Scripts, Bitcoin P2P Network, hardness of mining, Transaction in Bitcoin Network, transaction verifiability, anonymity, forks, payments and double spending, Consensus in a Bitcoin network, mathematical analysis of properties of Bitcoin, Bitcoin protocols – Bitcoin Mining strategy and rewards, life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

UNIT- III

Ethereum:- Ethereum Virtual Machine (EVM), Wallets for Ethereum, Ethereum Programming Language: Solidity, Smart Contracts, The turing completeness of smart contract languages, attacks on smart contracts, Ethereum Construction, DAO, GHOST, Vulnerability, Attacks, Sidechain: another type of blockchain, Namecoin

UNIT- IV

Cryptocurrency Regulation:- Stakeholders, Roots of Bitcoin, Bitcoin scripting vs Ethereum smart contracts, Legal Aspects - Cryptocurrency Exchange, Black Market and Global Economy, Global Acceptability perspective

TEXT/REFERENCES BOOKS/ARTICLES

1. **Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Princeton University Press (July 19, 2016).**
2. **Mastering Bitcoin: Unlocking Digital Cryptocurrencies by Antonopoulos**
3. **Bitcoin: A Peer-to-Peer Electronic Cash System by Satoshi Nakamoto**
4. **ETHEREUM: A Secure Decentralized Transaction Ledger by Gavin Wood, Yellow paper.2014.**
5. **A survey of attacks on Ethereum smart contracts by Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli**

Note:

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Course Outcomes:

At the end of the course, students will develop understanding for:

1. Cryptocurrency : Bitcoin and Ethereum
2. Building efficient blockchain models to carry out tasks with the practical approach.
3. Evaluating the use and risks involved with cryptocurrency
4. Smart contracts and their implications.

CSEH308C MOBILE AND SMART PHONE FORENSICS

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand mobile device forensics.
2. To learn different types of digital evidence.
3. To gain knowledge of different system like and roid and ios.
4. To understand mobile file system & data structures.

UNIT- I

Mobile Forensic:- Cell phone and mobile device forensics, Understanding Mobile device forensics, Understanding acquisition procedure ,Cell phone Crimes, SIM Architecture, Data Storage, Data Extraction, Files Stored on SIM, Mobile Operating System.

UNIT- II

Digital Evidence:- Mobile Device Forensics, Types of Evidence on Mobile Devices, Handling Mobile Devices as Sources of Evidence, Forensic Preservation of Mobile Devices, Forensic Examination and Analysis of Mobile Devices, Forensic Acquisition and Examination of SIM Cards, Investigative Reconstruction Using Mobile Devices Future Trends.

UNIT- III

Andriod and IOS Systems:- Architecture, Differentiation, Technological Composition, Introduction to Andriod Platform, Introduction to IOS Platform.

UNIT- IV

Mobile File Systems and Data Structures:- Introduction, What and How of Data, Types of Memory, File Systems, Rootfs, devpts, sysfs, cgroup, yaffs2, Procedure for handling an Andriod Devices, Logical Techniques VS Digital Techniques, Introduction to Mobile Malware.

TEXT/REFERENCES BOOKS:

4. **Guide to Computer Forensics and Investigations By Bill Nelson, Amelia Phillips, Christopher Stuart.**
5. **Digital Evidence on Mobile Devices.**
6. **Digital Evidence and Computer Crime, Third Edition Eoghan Casey. Published by Elsevier Inc. All rights reserved.**
7. **Andriod Forensic, Investigation, and Security by Andrew Hogg, Publisher Synergy Security in Mobile Communication by Professor Noureddine Boudriga. Mobile Malware Attacks and Defense By Ken Dunham.**

Note:

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Course Outcomes:

At the end of the course, students will develop understanding for:

1. Mobile device forensics.
2. Different type of mobile file system & digital forensic.
3. Technological composition of android & ios systems.
4. Mobile file system & data structures.

CSEH312C DATA MINING

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To learn data mining and Data preprocessing concepts.
2. To know about the association rules in data mining.
3. To perform various Classification and clustering algorithms.
4. To understand the strengths and limitations of various data mining models**.**

UNIT - I

Introduction to Data Mining:- Introduction**,** What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

UNIT - II

Association Rules:- Problem Definition, Frequent Item Set Generation, Frequent Itemsets, Closed Itemsets, and Association Rules. Apriori Algorithm: Finding Frequent Itemsets by Confined Candidate Generation, Generating Association Rules from Frequent Itemsets , Improving the Efficiency of Apriori, A Pattern-Growth Approach for Mining Frequent Itemsets ,Mining Frequent Itemsets Using Vertical Data Format, Mining Closed and Max Patterns.

UNIT - III

Classification:- Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction ,Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

Clustering:- Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms**,** Partitioning Clustering-K-Means Algorithm, PAM Algorithm, Hierarchical Clustering - Agglomerative Methods and divisive methods, Strengths and Weakness; Outlier Detection.

UNIT - IV

Web and Text Mining:- Introduction, web mining, web content mining, web structure mining, Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

TEXT/ REFERENCE BOOKS:

1. **Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition,2006.**
2. **Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, PearsonEducation.**
3. **Data mining Techniques and Applications, Hongbo Du Cengage IndiaPublishing**
4. **Data Mining Techniques, Arun K Pujari, 3rd Edition, UniversitiesPress**
5. **Data Mining Principles & Applications – T.V Sveresh Kumar, B. Esware Reddy,Jagadish S Kalimani,Elsevier.**
6. **Data Mining, Vikaram Pudi, P Radha Krishna, Oxford UniversityPress**

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Course Outcomes:

After completing the course the student will be able to:

1. Perform the preprocessing of data and apply mining techniques onit.
2. Identify the association rule applied on datasets.
3. Perform Classification and clustering algorithms
4. Classify web pages, extract knowledge from the Web.

Open Elective-I

(Common for All Branches except Bio Technology and Bio-Medical Engg for all Semesters)

HUM 350 C Communication Skills for Professionals

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To hone verbal and written communication
2. To acquaint students with multiple forms and formats of various technical and business reports
3. To develop competence for report writing with a focus on its techniques
4. To develop English Language Proficiency

UNIT I

(Contact hours 8)

Mechanics of Report Writing: Objectives of Report Writing; Types of Reports on the basis of forms and content. Introduction to Formats of Reports; Structure of Reports: Front Matter, Main Body, Back Matter

UNIT II

(Contact hours 10)

Writing Business and Technical Report: Preliminary Strategies for Report Writing: Data Collection, Report Planning, Use of Illustrations, Point Formation, Preparing Notes/Drafts Using Appropriate Formats: Memo Format, Letter Format, Manuscript Format, Printed Forms

UNIT III

(Contact hours 10)

Oral Communication and Soft Skills: Group Discussions; Interviews for jobs: preparation and facing them Professional Presentations: Power Point Presentation, Oral Presentation, Role of Kinesics (Body Language) in Communication, General Etiquettes in Office areas, corporate lunch and dinner Handling, Telephone calls

UNIT IV

(Contact hours 8)

Resumes and Job application: Writing of Resume--Chronological Resume and Functional Resume, Request for Reference/Recommendation, Writing Application Letters for Job; Writing Covering letter

RECOMMENDED READING

1. **Sharma,Sangeeta, and Binod Mishra. Communication Skills for Engineers and Scientists. PHI,2009.**
2. **Tyagi,Kavita, and Padma Mishra. Advanced Technical Communication. PHI, 2011.**
3. **Rizvi, M. Ashraf. Effective Technical Communication. McGraw Hill Education, 2014.**

4. **Kumar, Sanjay, and PushpLata. Communication Skills. OUP, 2011.**
5. **Raman, Meenakshi and SangeetaSharma.Communication Skills. OUP,2011.**
6. ***Bhatnagar, Nitin, and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson Education, 2013.**
   (The soft copy of the book is available in the university library)
7. **Mitra,Barun K. Personality Development and Soft Skills. OUP,2011.**
8. **Kaul, Asha. Business Communication. PHI, 2nd Edition.**
9. **Namee, Patrick Mc. Success in Interviews: How to Succeed in any Job Interview, Ist Edition.**
10. **Argenti, Paul. Corporate Communication.6th Edition. McGraw Hill Education, 2012.**

Note:

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The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Learning Outcomes:
At the end of the course, students will be able to:
1. Get acquainted with multiple forms and formats of various technical and business reports
2. Develop competence for report writing with a focus on its complex writing techniques and procedures.
3. Develop their speaking skills with professional proficiency.
4. Equip themselves for Letter Writing Skills.

Open Elective-I

(Common for All Branches)

HUM 352 C Soft Skills and Interpersonal Communication

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Course Objective:

- To train students to learn Soft Skills and engage in a successful and fruitful Interpersonal Communication

.

UNIT I

(Contact hrs 08)

Soft Skills: Introduction to Soft Skills & their classification, Importance of Soft Skills: Writing Resume/CV, Engaging in Group discussion, Appearing for Job interviews

UNIT II

(Contact hrs 10)

Interpersonal Skills, Behaviour, Relationships and Communication: Development and Role of Effective Interpersonal Skills, Development of Effective Speaking and Listening Skills

UNIT III

(Contact hrs 10)

Non-Verbal Elements in Interpersonal Communication: Role of Body Language, Paralinguistic Features, Proxemics/Space Distance and Haptics in Interpersonal Communication

UNIT IV

(Contact hrs 08)

Personality Development for Personal and Professional Growth: Desirable Personality, Personality Types, Analysis of Personality Development (Freudian and Swami Vivekananda's Concept), Grooming Personality for Personal and Professional Life

RECOMMENDED READING:

1. **Mitra, Barun K. Personality Development and Soft Skills. Delhi: OUP, 2nd Edition, 2016.**
2. **Butterfield, Jeff.Soft Skills for Everyone. Cengage Learning, 2017.**
3. **Raman, Meenakshi and Sangeeta Sharma. Communication Skills. OUP, 2011.**
4. **Ramesh, Gopalaswamy and Mahadevan Ramesh. The ACE of Soft Skills, Pearson India,2010.**
5. **Ribbons, Geoff and Richard Thompson.Body Language.Hodder& Stoughton, 2007.**
6. **Sharma, Sangeeta and Binod Mishra.Communication Skills for Engineers and Scientists. PHI, 2017.**

Note:

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For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Learning Outcomes:

At the end of the course, students will be able to:
1. Know now how soft skills complement hard skills for career growth
2. Enhance communicative competence for professional enhancement
3. Learn desirable body language and other non-verbal elements in interpersonal communication
4. Groom personality for handling effectively various situations of personal and professional life

Open Elective-I

(Common for All Branches for all Semesters)

HUM 354 C Introduction to French Language

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To enable students to understand the elementary communication structures of French language
2. To enable students to know and learn elementary vocabulary and grammar of French language
3. To enable students to engage in simple dialogues in French language

UNIT I

(Contact hours 10)

VOCABULAIRE: Les Salutations, Les jours de la semaine, Les moins de l'année, Les couleurs, Les professions, Les nombrescardinaux, Les lieux de la ville, Les nationalites, Personnesetobjetscaractéristiques d'un pays, Civilisation: France,de la sociétéfrancaise, les monuments, les fêtes

UNIT II

(Contact hours 10)

GRAMMAIRE: Conjugation des verbeetre, avoir, aller; Conjugation des verbe –er, -ir, -re Masculin/feminine,Singulier/ pluriel, Accord des nomset des adjectives, Articles indéfinisetdéfines, Négation simple, Interrogation, Futurproche, On= Nous, Articles partitifsetcontractes, La date etl'heure

UNIT III

(Contact hours 8)

ECRITURE (comprehension des écrits, Production écrite), Presentez- vous, Mon meuillierami, Ma famille, Carteset messages d'invitation, d'acceptationou de refus, Ecrives des scenes

UNIT IV

(Contact hours 8)

COMPREHENSION (écouter, production orale): Se presenter à ungroupe, Parlez/ écoutezdevotreville, Parlez/écoutezdesesactivités de loisirs, Parlez /écoutez de vosgoûts, Demander/ donnerun explication, Identifier unepersonneouun objet, Demander/dire cequ'ona fait

RECOMMENDED READING

1. **Echo – A1 Methode de Francais, CLE International (Distributed in India by W. R. Goyal Publishers & Distributors, Delhi)**
2. **Connexions, niveau 1, Yves Loiseau and R_gineM_rieux(Goyal Publishers)**
3. **Alter Ego-1, Hachette (Distributed in India by W. R. Goyal Publishers & Distributors, Delhi)**
4. **Forum- Methode de Francais 1, Hachette (Distributed in India by W. R. Goyal Publishers & Distributors, Delhi)**
5. **450 Exercises de Grammaire, CLE International (Distributed in India by W. R. Goyal Publishers & Distributors, Delhi)**
6. **Audio- Video study material**

7. Supplementary handouts
Note:

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For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Learning Outcomes:
At the end of the course, students will be able to:
1. Familiarize with the basics of French language
2. Understand and express vocabulary and grammar through writing
3. Demonstrate understanding through simple dialogues in French

Open Elective-I

(Common for All Branches for all Semesters)

HUM 356 C Introduction to German Language

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To enable students to understand the elementary communication structures of German language
2. To enable students to know and learn elementary vocabulary and grammar
3. To enable students to engage in simple dialogues in German

UNIT I

(Contact hours 10)

Introduction to German alphabets, Numbers 0- 100 (basic algebraic expressions), Vocabulary of days and months, Adverbs of time, Ordinal numbers in German, Phonetics and pronunciation

UNIT II

(Contact hours 10)

Introduction to the simple possessive pronouns, Sentence: statement, question, (question for completion and decision) command, Coordination of clauses, Placing of the verb in the sentence: first, second and last place, Word order in main clause, Details of time, manner and place (casual)

UNIT III

(Contact hours 8)

Verb: infinitive, imperative, indicative – Präsens, Perfekt, Präteritum of auxiliary and modal verbs, modal verbs (meaning, indicative Präsens&Präteritum, möchten), Verbs with prefixes – separable and inseparable, Nouns: Gender, plural, Nominative, Accusative, Dative Articles: Definite and Indefinite, Adjectives: predicative use

UNIT IV

(Contact hours 8)

Day-to-day conversation in German: Introducing oneself and other, greeting and taking leave, Meeting people, Time and date, months and weekdays, Inquire and name the country of origin, languages, Introduce family members and friends

RECOMMENDED READING

1. **Tangram AktuellNiveau A1, Max HeuberVertag, Ismaning, 2005 (Published and distributed in India by German Book Depot, Delhi)**
2. **Netzwerk A1, KlettVerlag, Muenchen, 2013 (Published and distributed in India by German Book Centre, Delhi, 2015).**
3. **Sprachkurs Deutsch I &2. Diesterweg (Moritz) Verlag, Frankfurt am Main, 1989, (Published and distributed in India by Goyal Saab Publishers & Distributors, New Delhi)**
4. **Schuelerduden Grammatik, BibliographischesInstitutand F.ABrockhaus, 2000.**
5. **ThemenAktuell 1, Kursbuch, Max HeuberVerlag, Ismaning, Deutschland, 2003 (Published and distributed in India by German Book Centre, Delhi,2010).**
6. **Audio-video Study Material**
7. **Supplementary Handouts**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Learning Outcomes:
At the end of the course, students will be able to:
1. Familiarize with the basics of German language
2. Understand and express vocabulary and grammar through writing
3. Demonstrate understanding through simple dialogues in German

Open Elective-I

MGT402C HUMAN VALUES, ETHICS AND IPR

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

To help the students appreciate the essential complementarities between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

Unit-I

Human Values: Understanding the need, basic guidelines, Self Exploration - its content and process; 'Natural Acceptance' and Experiential Validation, Continuous Happiness and Prosperity- Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly.

Unit-II

Different kinds of value: Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

Unit-III

Modern approach to the study of values: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship Understanding harmony in the Family, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman).

Unit-IV

Professional Ethics & IPR: Values in Work-life, Professional Ethics and Ethos, Code of conduct, Whistle Blowing, Corporate Social Responsibility.IPR: meaning, nature, scope and relevance of IPR. Kinds of IPR: Copyright, Patents, Trademark, Geographical Indication, Industrial design, Plant Variety. Benefits, Emerging dimensions and Rational for protection of IPR.

Suggested Readings:

1. **R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics, Excel Books, New Delhi**
2. **A.N. Tripathy, 2003, Human Values, New Age International Publishers.**
3. **E G Seebauer& Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.**
4. **M Govindrajan, S Natrajan& V. S Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.**
5. **S. B. Gogate, Human Values & Professional Ethics, Vikas Publishing House Pvt. Ltd., Noida.**

Reference Books

1. A Nagraj, 1998 JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
2. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
3. Prof. A.R.Aryasri, DharanikotaSuyodhana, Professional Ethics and Moral, Maruthi Publications.
4. A. Alavudeen, R.Kalil Rahman and M. Jayakumaran, Professional Ethics and Human Values, University Science Press.
5. Prof.D.R.Kiran, 2013, Professional Ethics and Human Values, Tata McGraw-Hill
6. Jayshree Suresh and B. S. Raghavan, Human Values And Professional Ethics, S.Chand Publications

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

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Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:
At the end of the course:

1. Students will be able to understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Understand and can distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the role of a human being in ensuring harmony in society and nature.
4. Students will be aware of the significance of Intellectual Property as a very important driver of growth and development in today's world and to be able to statutorily acquire and use different types of intellectual property in their professional life.

Open Elective-I

MGT404C HUMAN RESOURCE MANAGEMENT

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

To help the students develop an understanding of the management of human resources and develop abilities and skills required to manage them.

Unit-I

Introduction – nature and scope of human resource management, HRM objectives and functions, HRM policies, HRM in globally competitive environment; strategic human resource management.

Unit-II

Acquiring human resources – Man power planning, Job evaluation, job analysis and job design. Recruitment: Sources, Methods, constraints & challenges, selection: objectives and process, placement and induction.

Unit-III

Developing human resources: Training: types, methods, training vs. development and evaluation of a training programme and training need assessment, career planning and development.

Unit-IV

Performance appraisal: methods, process and challenges of performance appraisal, performance appraisal vs. potential appraisal, Compensation: wages & salaries administration and factors influencing compensation levels.

Suggested Readings:

1. **Jyothi, Human Resource Management, Oxford University Press**
2. **Bohlander George and Scott Snell, Management Human Resources, Cengage, Mumbai**
3. **Bhattacharyya, Dipak Kumar, Human Resource Management, Excel Books, NewDelhi**
4. **Cascio Wayne F., Managing Human Resources, TMH, New Delhi**
5. **DeCenzo, David A, and Stephan P. Robbins, Fundamentals of Human Resource Management, Wiley India, New Delhi**
6. **Denisi, Angelo S, and Ricky W Griffin, Human Resource Management, Biztantra, New Delhi**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:
At the end of the course:

1. To have an understanding of the basic concepts, functions and processes of human resource management
2. To be aware of the role, functions and functioning of human resource department of the organizations.
3. To Design and formulate various HRM processes such as Recruitment, Selection, Training, Development, Performance appraisals and Reward Systems, Compensation Plans and Ethical Behavior.
4. Develop ways in which human resources management might diagnose a business strategy and then facilitate the internal change necessary to accomplish the strategy.

CSE431C CYBER SECURITY

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand cyber crime and its laws.
2. To work with tools and methods used in cyber crime.
3. To understand the life cycle of digital forensics.
4. To learn and understand web threats, challenges and protection policies.

UNIT- I

Introduction To Cybercrime:- Cybercrime and Information Security, Classifications of Cybercrimes, The need for Cyber laws, The Indian IT Act Challenges to Indian Law and Cybercrime Scenario in India, Weakness in Information Technology Act and it consequences, Digital Signatures and the Indian IT Act, Cybercrime and Punishment; Technology, Students and Cyber law; Survival tactics for the Netizens, Cyber-offenses: Cybers talking, Cyber cafe and Cyber crimes, Botnets, Attack Vector, Cloud Computing;

UNIT- II

Tools And Methods Used In Cybercrime:- Proxy Servers and Anonymizers, Phishing and identity theft, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Stenography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow; Cybercrime: Mobile and Wireless Devices: Trends in Mobility, Attacks on Wireless Networks, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges, Registry Settings for Mobile Devices, Authentication Service Security Attacks on Mobile/Cell Phones

UNIT- III

Understanding Computer Forensics:- The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Computer Forensics and Stenography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics, Forensics Auditing, Anti forensics.

UNIT- IV

Cyber security Organizational Implications:- Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications from Cloud Computing, Social Media Marketing, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling, Forensics Best Practices, Media and Asset Protection, Importance of Endpoint Security in Organizations.

TEXT/ REFERENCE BOOKS:

1. "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Nina Godbole, Sunit Belapur, Wiley India Publications, April, 2011.

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

1. Able to demonstrate cyber crime its laws and related terms.
2. Work with SQL injection, DOS attacks etc.
3. Explain computer forensic, Network forensic cyber forensic.
4. Understand safe computing guidelines, usage policies and incident handling.

Open Elective-II

CHE457C : INDUSTRIAL SAFTEY

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

The purpose of this course is

1. To teach the students the concept of industrial safety and provide useful practical knowledge for workplace safety.
2. To identify, evaluate control the hazards to prevent or mitigate harm or damage to people, property and the environment.
3. To understand about fire and explosion, preventive methods, relief and its sizing methods
4. To analyze industrial hazards and its risk assessment

UNIT-I

Introduction: Concept of loss prevention, origin of process hazards, types of process hazards, acceptable risks, accident and loss statics, nature of accident process, concepts of inherent safety in plants or Factories, dose Vs response curve, toxicants entry route, thresh limit values, safety regulations.

UNIT-II

Hazards: Fire, Chemical (industrial and laboratory scale), electrical, mechanical, biohazards (natural and anthropogenic), toxic materials, their types and preventive measures, Liquid and vapor phase hazardous methods, storage and handling, containment, precautions, Personal safety precautions.

UNIT-III

Risk management principles, risk analysis techniques, risk control, hazards operability studies, hazard analysis, Fault tree analysis, Consequences analysis, human error analysis, accidental error analysis, economics of risk management, check list, reliability theory, event tree, HAZOP, safety reviews, what if analysis.

UNIT-IV

Safety audit, procedure for safety auditing, audit report, safety report, safety training, emergency planning and disaster management, introduction to security risk factors tables.

TEXT BOOKS:

1. **Chemical Hazards and safety, 2nd Edition, DawandeDenet& Co. , 2012**
2. **Loss preventions in process industries, Lees Butterworth-Heinemann, 1980.**
3. **Industrial safety Handbook, William and Handley, McGraw Hill.**

REFERENCE BOOKS:

1. Safety and Hazard management in Chemical Industries, Vyas, Atlantic 2013.
2. Industrial safety, health environment & Security, Basudev Panda, Laxmi publication ISBN-97893-81159-43-9
3. Industrial Safety and Health Management, 4th Edition, C. Ray Asfahl, Prentice Hall International Series, 1984

4. Industrial Accident Prevention : A Safety Management Approach, Herbert William Heinrich

NOTES:

1. **Part A: Till academic session 2020-2021:**In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting at least one question from each unit.

   Part B: From Academic Session 2021-2022 onwards: For the semester examination, nine questions are to be set by the examiner. Question no. 1, containing 6-7 short answer type questions, will be compulsory & based on the entire syllabus. Rests of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit. All questions will carry equal marks.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

   Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Course Outcomes:

Students will be able to:

1. Analyze the effect of release of toxic substances.
2. Understand the industrial laws, regulations and source models.
3. Understand the methods of hazard identification and preventive measures and develop safety programs to prevent the damage or loss.
4. Conduct safety audits and improve safety practices.

Open Elective-II

CE406C : DISASTER MANAGEMENT

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Unit-I

Introduction to Disaster Management: Disaster, Emergency, Hazard, Mitigation, Disaster Prevention, Preparedness and Rehabilitation, Risk and Vulnerability, Classification of Disaster, Natural and Man-made Disasters, International day and Decade of Disaster Reduction.

Risk and Vulnerability to disaster mitigation and management options: Warning and Forecasting.

Unit-II

Hydro-meteorological based disasters I: Disaster Management Act 2005, Role of NDMA, NDRF, NIDM, Tropical Cyclones, Floods, droughts, mechanism, causes, role of Indian Metrological Department, Central Water Commission, structure and their impacts, classifications, vulnerability, Early Warning System, Forecasting, Flood Warning System, Drought Indicators, recurrence and declaration, Structural and Non-structural Measures.

Hydro-meteorological based disasters II: Desertification Zones, causes and impacts of desertification, Characteristics, Vulnerability to India and Steps taken to combat desertification, Forest Fires; Causes of Forest Fires; Impact of Forest Fires, Prevention.

Unit-III

Geological based disasters: Earthquake, Reasons, Compression, Shear, Rayleigh and Love Waves; Magnitude and Intensity Scales, Direct and Indirect Impact of Earthquake; Seismic Zones in India, Factors, Indian Standards Guidelines for RCC and Masonry Structures, Prevention and Preparedness for Earthquake, Tsunamis, Landslides and avalanches: Definition, causes and structure; past lesson learnt and measures taken; their Characteristic features, Impact and prevention, Atlas (BMTRPC); structural and non-structural measures.

Unit-IV

Manmade Disasters I: Chemical Industrial hazards; causes and factors, pre- and post-disaster measures; control; Indian Standard Guidelines and Compliance;

Traffic accidents; classification and impact, Fire hazards; Classification as per Indian Standards;

Fire risk assessment; Escape routes; fire-fighting equipment; classification of buildings, fire zones, occupancy loads; capacity and arrangements of exits,

Use of remote sensing and GIS in disaster mitigation and management.

Text Books:

1. **Thomas D. Schneid., Disaster Management and Preparedness, CRC Publication, USA, 2001**
2. **Patrick Leon Abbott, Natural Disasters, Amazon Publications, 2002**
3. **Ben Wisner., At Risk: Natural Hazards, People vulnerability and Disaster, Amazon Publications, 2001**
4. **Oosterom, Petervan, Zlatanova, Siyka, Fendel, Elfriede M., "Geo-information for Disaster Management", Springer Publications, 2005**

5. **Savindra Singh and Jeetendra Singh, Disaster Management, Pravalika Publications, Allahabad**
6. **NidhiGaubaDhawan and AmbrinaSardar Khan, Disaster Management and Preparedness, CBS Publishers & Distribution**

Reference Books:

1. Selected Resources Published by the National Disaster Management Institute of Home Affairs, Govt. of India, New Delhi.

Note:

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Course Outcomes:

At the end of the course, the student will be able to:

1. Knowledge of the significance of disaster management,
2. Analyze the occurrences, reasons and mechanism of various types of disaster
3. Understand the preventive measures as Civil Engineer with latest codal provisions
4. Apply the latest technology in mitigation of disasters

Open Elective-II

ECE327C Consumer Electronics

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
3	0	0	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Unit I

(12 Lectures)

Monochrome TV (Introduction): Elements of a TV System, Picture transmission, Sound transmission, Picture reception, Sound reception, Synchronization, Receiver control, Image continuity, Scanning Process, Aspect Ratio, Flicker, Composite Video Signal, Picture Elements, Kell factor, Vertical Resolution, Horizontal Resolution, Video bandwidth, Interlacing, 625 Line System, Bandwidths for TV Transmission, Vertical and horizontal synch detail, Vestigial Side Band transmission(Advantages and Disadvantages)

Monochrome TV (Picture and Camera Tubes): Monochrome picture tube, beam reflection, Beam focusing, Screen Phosphor, Faceplate, Picture tube characteristics, picture tube circuit controls, Monochrome Camera Tubes: Basic principle, Image Orthicon, Vidicon, Plumbicon

Unit II

(12 Lectures)

Colour TV Essentials: Compatibility , Colour perception, Three Colour theory, Luminance, Hue and Saturation, Dispersion and Recombination of light, Primary and secondary colours, luminance signal, Chrominance Signal, Colour picture tube, colour TV Camera, Colour TV display Tubes, colour Signal Transmission, Bandwidth for colour signal transmission, Colour TV controls. Cable TV, Block Diagram and principle of working of cable TV.

Plasma and LCD: Introduction, liquidcrystals, types of LCD's,TN, STN, TFT, Power requirements, LCD working, Principle of operation of TN display, Construction of TN display, Behaviour of TN liquid crystals, Viewing angle, colour balance, colour TN display, limitatons, advantages, disadvantages, applications.

Unit III

(10 Lectures)

LED and DMD : Introduction to LED Television , comparison with LCD and Plasma TV's, schematic of DMD, introduction to Digital Micro Mirror device, Diagram of DMD, principle of working, emerging applications of DMD.

Microwave Ovens and Air Conditioners: Microwaves, Transit Time, Magnetron, Waveguides, Microwave Oven, Microwave Cooking. Air conditioning, Components of air conditioning systems, all water Air conditioning systems, all air conditioning Systems, Split air conditioner.

Unit IV

(11 Lectures)

Microphones: Introduction, characteristics of microphones, types of microphone: carbon, movingcoil, wireless, crystal, introduction to tape recorder.

Loudspeaker: Introduction to ideal and basic loudspeaker, loudspeaker construction types of loudspeaker: Dynamic and permanent magnet, woofers, tweeters, brief introduction to baffles, equalisers.

Text Books :

1. **Consumer Electronics by S. P. Bali, Pearson Education.**
2. **Complete Satellite and Cable T.V by R.R Gulati, New Age International Publishers**

Reference Books:

1. Monochrome and ColourTelevision by R. R. Gulati, New Age International Publishers

Note:

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For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course outcomes: At the end of the course, students will demonstrate the ability to:

1. Identify and explain basic working of electronics products like TV, Microphone, loudspeaker, AC, Microwave ovens.
2. Learn various components of composite video signal and differentiate between line, brightness, saturation and to design the lower power consumption device, the primary challenge is how to minimize overall cost.
3. Acquire ability to design different display screen so that effect of radiations on eyes will be reduced.
4. Understand the general importance of product safety to consumers & producers will reduce the various adverse impacts of these devices on common man.

CSE382C COMPILER DESIGN LAB

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To acquire knowledge in different phases and passes of Compiler.
2. To use the Compiler tools like LEX, YACC, etc.
3. To design different types of compiler tools to meet the requirements of the realistic constraints of compilers.
4. To use Top-down and Bottom-up parsers. Construction of LL, SLR, CLR and LALR parse table.

List of Practicass:

1. Practice of LEX/YACC of compiler writing.
2. Write a program to check whether a string belong to the grammar or not.
3. Write a program to generate a parse tree.
4. Write a program to find leading terminals.
5. Write a program to find trailing terminals.
6. Write a program to compute FIRST of non-terminal.
7. Write a program to compute FOLLOW of non-terminal.
8. Write a program to check whether a grammar is left Recursion and remove left Recursion.
9. Write a program to remove left factoring.
10. Write a program to check whether a grammar is operator precedent.
11. To show all the operations of a stack.
12. To show various operations i.e. red, write and modify in a text file.

Course Outcomes:

After completing the course the students will be able to:

1. Understand the concepts of Compilers
2. Understand the concepts of The actual roles of the lexical analyzer
3. Understand the concepts of different Parsing techniques and Construction of syntax trees
4. Understand the concepts of Type checking

CSE384C MOBILE APPLICATIONS DEVELOPMENT LAB

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To describe and compare different mobile application models/architectures and patterns.
2. To apply mobile application models/architectures and patterns to the development of a mobile software application.
3. To describe the components and architecture of a mobile development framework (Google's Android Studio).
4. To apply a mobile development framework to the development of a mobile application.

List of Practicals:

1. Getting Started with Android Development.
2. Activities and Views: Android Manifest.xml, Activity Class, Basic View Components: Layouts and Buttons.
3. Navigation with Data: Working with Intent, Sharing Data Between Activities, Application Class.
4. Android Resources: String Resources, Loading Strings in XML, Loading Strings in Code, The Resource Values Folder.
5. Drawables - Image Basics, Drawable Folders and Qualifiers, Dimensions, Image Padding, The ImageButton Widget.
6. Lists: Implementing an Android List, ListView, ListActivity, Empty Lists, ListAdapter, Sorting the Adapter, Overriding ArrayAdapter, List Interaction.
7. Dialogs, New and Old: AlertDialog, Custom Dialog, Support Library, Fragments, DialogFragment
8. Menus: Options Menu, Modifying an Options Menu, Context Menu.
9. Saving Data with Shared Preferences: Shared Preferences, Getting Started with SharedPreferences, PreferenceActivity.
10. Saving Data with a Database: Setting Up SQLite, Creating a Helper, using the Helper, Cursor and CursorAdapater.
11. Threading with AsyncTasks: Threading in Android, AsyncTask, Tracking Progress.
12. Styles and Themes: Introduction to Styling: Defining Styles, Defining Themes, Style Inheritance, Direct Theme References.

Course Outcomes:

After completing the course the student will be able to:

1. Understand the concepts of mobile application models/architectures and patterns.
2. Apply mobile application models/architectures and patterns to the development of a mobile software application.
3. Understand the components and architecture of a mobile development framework (Google's Android Studio).
4. Apply a mobile development framework to the development of a mobile application.

CSE386C DIGITAL IMAGE PROCESSING LAB

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
0	**0**	**4**	**2**	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To review the fundamental concepts of a digital image processing system.
2. To analyze the images in the frequency domain using various transforms.
3. To evaluate the techniques for image enhancement and image restoration.
4. To categorize various compression techniques.

The students will be required to carry out 10 or 12 Lab exercises covering the theory course **CSE326C: Digital Image Processing** as assigned by concerned faculty.

Course Outcomes:

After completing the course the student will be able to:

1. Review the fundamental concepts of a digital image processing system.
2. Analyze the images in the frequency domain using various transforms.
3. Evaluate the techniques for image enhancement and image restoration.
4. Categorize various compression techniques.

CSE388C ADVANCED JAVA LAB

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Course Objectives:

1. To use graphics, Animations and Multithreading for designing Simulation and Game based applications.
2. To design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
3. To design and develop Web applications
4. To design Enterprise based applications by encapsulating an application's business logic.

The students will be required to carry out 10 or 12 experiments covering the theory course **CSE328C: Advanced Java** as assigned by the concerned faculty.

Course Outcomes:

After completing the course the student will be able to:

1. Use graphics, Animations and Multithreading for designing Simulation and Game based applications.
2. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
3. Design and develop Web applications.
4. To design Enterprise based applications by encapsulating an application's business logic.

CSE390C IoT ARCHITECTURE & PROTOCOLS LAB

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

Students should be able to work with

1. Python
2. Raspberry Pie
3. Arduino

List of Practicals

1. To study and configure raspberry pie and arduino
2. Write a Program for data types in python.
3. Write a Program for arithmetic operation in Python.
4. Write a Program for looping statement in Python
5. Write program for Blink LED using arduino/raspberry pie.
6. Write Program for RGB LED using Arduino/ raspberry pie.
7. Study the Temperature sensor and write a program for monitoring temperature using Arduino/ raspberry pie.
8. Write a Program to upload temperature and humidity data on cloud

Course outcomes:

On successful completion of the course, the student will be able to

1. Write programs in Phython
2. Work with Raspberry Pie
3. Work with Arduino
4. Device small projects using all hardware and software

CSEH382C CRYPTOCURRENCY WITH ETHEREUM LAB

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
--	--	4	2	**Class Work**	:	**50 Marks**
				Examination	:	**50Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Course Objectives:

1. To understand working of Ethereum platform.
2. To study the security issues and safeguards related to trading.
3. To create smartcontracts using Remix.
4. To create a blockchain application.

Learn the basics of Ethereum platform with Ethereum Studio, a web-based IDE to create and test smart contracts and build a frontend.

The student should do the following using the learned concepts:

i. Naive Blockchain construction
ii. Implement Memory Hard algorithm - Hashcash implementation
iii. Implement Direct Acyclic Graph
iv. Play with Go-ethereum
v. Smart Contract Construction using Remix - an Ethereum IDE and tools for the web. Remix is an open source tool written in JavaScript with support for writing of Solidity contracts, testing, debugging and deploying of smart contracts.
vi. Develop Toy application using Blockchain
vii. Implement Mining puzzles

Course Outcomes:

After completing the course the student will be able to:

1. Understand Ethereum platform.
2. Implement the security issues and safeguards related to trading.
3. Create smartcontracts using Remix.
4. Develop a blockchain application.

CSEH386C INFORMATION SECURITY AND DATA HIDING LAB

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To learn the concept of information hiding.
2. To provide an insight to steganography techniques.
3. To learn Watermarking techniques
4. To understand the attacks on data hiding and how integrity of data is maintained.

The students will be required to carry out 10 or 12 experiments covering the theory course **CSEH306C** Information Security and Data Hiding as assigned by the concerned faculty.

Course Outcomes:

After completing the course the student will be able to:

1. Learn the concept of information hiding.
2. Understand the steganography techniques.
3. Learn Watermarking techniques
4. Understand the attacks on data hiding and how integrity of data is maintained.

CSEH390C DATA ANALYTICS WITH PYTHON LAB

B. Tech. Semester – VI (Computer Science and Engg.)

L	T	P	Credits			
0	0	4	2	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75 Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To learn the basic process of data science.
2. To learn Python notebooks.
3. To have an applied understanding of how to manipulate and analyze uncurated datasets, basic statistical analysis and machine learning methods.
4. To have an understanding on how to effectively visualize results.

The students will be required to carry out 10 or 12 experiments covering the theory course **CSE310C: Data Analytics with Python** as assigned by the concerned faculty.

Course Outcomes:

After completing the course the student will be able to:

1. Find a dataset, formulate a research question, use the tools and techniques of this course to explore the answer to that question.
2. Learn Python notebooks.
3. Understand the manipulation and analysis of uncurated datasets, basic statistical analysis and machine learning methods.
4. Understand to effectively visualize results.

CSE401C CLOUD ARCHITECTURE & SECURITY

B. Tech. Semester – VIII (Computer Science and Engg.)

L	T	P	Credits			
3	-	-	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand the basics of Cloud Computing and its delivery models.
2. To study the concepts, processes, and best practices needed to successfully secure information within Cloud Infrastructures.
3. To get through the risk and compliance responsibilities along-with challenges for each Cloud service delivery models.
4. To know of intuition of data intensive computing and its solutions.

UNIT- I

Cloud Computing Architecture:- Cloud introduction and overview, Requirements for Cloud Computing, Introduction of Cloud computing architecture, On Demand Computing, Novel applications of cloud computing, Pricing models of Cloud Computing and associated risks, Virtualization at the infrastructure level, Security in Cloud computing environments, CPU Virtualization, Hypervisor and its types, Storage Virtualization, The SPI Framework for Cloud Computing, The Traditional Software Model, The Cloud Services Delivery Models, Cloud Deployment Models, Key Drivers to Adopting the Cloud services, The Impact of Cloud Computing on Users, Barriers to Cloud Computing Adoption in the Enterprise, Cloud Computing v/s Grid Computing.

UNIT-II

Security Issues In Cloud Computing:- Infrastructure Security: The Network Level, The Host Level, The Application Level, Data Security and Storage, Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security, Identity and Access Management, Trust Boundaries and IAM, IAM Challenges, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud, Cloud Authorization Management.

UNIT-III

Security Management In The Cloud:- Security Management Standards in the Cloud, Availability Management: SaaS, PaaS, IaaS. Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Privacy protection mechanisms in the Cloud Computing, Governance, Risk, and Compliance (GRC) in relation to Cloud Computing, Legal and Regulatory Implications, International Laws and Regulations, Cloud Security Alliance, Auditing the Cloud for Compliance.

UNIT-IV

Data Intensive Computing:- Map-Reduce Programming Models, Characterizing Data-Intensive Computations, Technologies for Data-Intensive Computing, Programming Platforms, Example Application, HDFS, HIVE, Introduction to Google App Engine, Fog Computing and its Architecture.

TEXT/ REFERENCES BOOK:

1. **Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski, "Cloud Computing Principles and Paradigms," Wiley & Sons pub.**
2. **Michael J. Kavis, "Architecting the Cloud: Design Decisions for Cloud Computing Service Models", Wiley.**
3. **Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press.**
4. **R. Buyya, C. Vecchiola and S. Thamarai Selvi, "Mastering Cloud Computing," McGraw Hill.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After completion of course, students would be able to:

1. Get well verse with the basic terminologies of Cloud Computing.
2. Identify security aspects of each Cloud model.
3. Develop a risk and compliance management strategy for moving to the Cloud.
4. Indentify the intuition of data intensive computing mechanisms.

CSE403C MACHINE LEARNING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To learn the concept of how to learn patterns and data without being explicitly programmed.
2. To design and analyses various clustering and machine learning algorithms with a modern outlook focusing on recent advances.
3. Explore modeling and estimation paradigms of machine learning.
4. To explore the use cases of learning technique.

UNIT-I

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:- K-means/Kernel K-means Dimensionality Reduction: PCA and kernel PCA Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models)

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

UNIT- III

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

UNIT- IV

Scalable Machine Learning (Online Learning and Inference, Recent trends classification methods. and Distributed Learning), Introduction to Bayesian in various learning techniques of machine learning

TEXT/REFERENCES BOOKS:

1. **Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012**
2. **Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)**
3. **Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

B. Tech. 3rd semester to 8th semester CSE: Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2018-19 & onwards and trailing students.

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, a student should be able to:

1. Get verse with the concept of learning patterns.
2. Learn clustering and machine learning algorithms.
3. Understand modeling and estimation paradigms of machine learning.
4. Use learning technique for practical applications.

CSE405C SOFTWARE DESIGN AND ENTERPRISE COMPUTING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To fix software flaws and bugs in various software.
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.
3. To learn techniques for successfully implementing and supporting network services on an enterprise scale and heterogeneous systems environment.
4. To learn methodologies and tools to design and develop secure software containing minimum vulnerabilities.

UNIT-I

Secure Software Design: Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts.

UNIT-II

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: 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

Software containing minimum vulnerabilities and flaws, perform security testing and quality assurance. Managing software quality in an organization, software configuration management, software measurement and metrics.

TEXT/REFERENCE BOOKS:

1. **Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett.**
2. **Kenneth R. van Wyk, Mark G. Graff, Dan S. Peter, Diana L. Burley, Enterprise Software Security, Addison Wesley.**
3. **Nina S. Godbole, Software Quality Assurance: Principles and Practices, Narosa Publication.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, a student should be able to:

1. Differentiate between various software vulnerabilities
2. Understand the Software process vulnerabilities for an organization.
3. Monitor resources consumption in a software.
4. Inter relate security and software development process.

CSE407C NATURAL LANGUAGE PROCESSING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To know the basic terminologies of natural language processing.
2. To understand the formalization mechanisms of grammars.
3. To explore the mechanisms for drawing inferences from the given logic.
4. To identify and apply the learning mechanisms to the NLP applications.

UNIT-1

Components of natural language processing: Linguistic Essentials: lexicography, parts of speech and morphology, syntax, semantics, pragmatics: word level representation of natural languages prosody & natural languages.

UNIT-II

Grammar formalisms and treebanks: chomsky hierarchy, Left-Associative grammars, ambiguous grammars, resolution of ambiguities, Efficient parsing for context-free grammars (CFGs), Statistical parsing and probabilistic CFGs (PCFGs), Lexicalized PCFGs. Computation linguistics: recognition and parsing of natural language structures: ATN & RTN, General techniques of parsing: CKY, Earley & Tomitas algorithm.

UNIT-III

Semantics-knowledge representation semantic networks logic and inference pragmatics, graph models and optimization, prolog for natural language semantic.

UNIT-IV

Application of NLP: intelligent work processors: Machine translation and learning, user interfaces, Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP, Natural Language Generation.

TEXT/REFERENCE BOOKS:

1. **"Natural Language Understanding" James Allen ,Benjamin-1995, cummings Pub. Comp. Ltd., Reference Books.**
2. **"Speech And Language Processing: An Introduction to Natural Language Processing " Dan Jurafsky, James H. Martin, Prentice Hall, 2009.**
3. **"Foundations of Statistical Natural Language Processing" Christopher D. Manning, Hinrich Schütze, MIT press 1999.**
4. **Radford, Andrew et. al., Linguistics, An Introduction, Cambridge University Press, 1999.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:
After successful completion of the course, a student should be able to:

1. Get verse with the basic terminologies of natural language processing.
2. Know the various types of formalization mechanisms of grammars.
3. Apply the inference mechanisms for drawing conclusions.
4. Use learning mechanism for solving NLP problems.

CSE421C DISTRIBUTED COMPUTING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To understand the basic terminologies of distributed computing systems.
2. To learn about the distributed operating system and its implications.
3. To explore the mechanisms of high performance computing.
4. To study the working mechanisms of contemporary distributed systems.

UNIT-I

Fundamentals of Distributed Computing: Architectural models for distributed and mobile computing systems. Basic concepts in distributed computing such as clocks, message ordering, consistent global states, and consensus. Basic Algorithms in Message: Passing Systems, Leader Election in Rings, and Mutual Exclusion in Shared Memory, Fault-Tolerant Consensus, Causality and Time. Message Passing: PVM and MPI.

UNIT-II

Distributed Operating Systems and network operating systems, Distributed File systems. Client/server model for computing, common layer application protocols (RPC, RMI, streams), distributed processes, network naming, distributed synchronization and distributed object-based systems. Simulation: A Formal Model for Simulations, Broadcast and Multicast, Distributed Shared Memory, Fault-Tolerant Simulations of Read/Write Objects Simulating Synchrony, Improving the Fault Tolerance of Algorithms, Fault-Tolerant Clock Synchronization.

UNIT-III

Advanced Topics: Randomization, Wait-Free Simulations of Arbitrary Objects, and Problems Solvable in Asynchronous Systems, Solving Consensus in Eventually Stable Systems, High Performance Computing-HPF, Distributed and mobile multimedia systems. Adaptability in Mobile Computing, Grid Computing and applications.

UNIT-IV

Distributed Environments: Current systems and developments (DCE, CORBA, JAVA).
Case study- Distributed information searching on the network- Mobile Agent Approach.

TEXT/REFERENCE BOOKS

1. **Hagit Attiya, Jennifer Welch, Distributed Computing: Fundamentals, Simulations, and Advanced Topics, 2nd Edition, March 2004.**
2. **R. B. Patel, Mobile Computing-A Practical Approach, 1st edition, Khanna Publishing House Delhi**
3. **Mullendar S. Distributed Systems, 2nd Ed. Addison, Wesley 1994.**
4. **Tannenbaum, A. Distributed Operating Systems, Prentice Hall 1995.**
5. **Helal, Abdelsalam A. et al. Anytime, Anywhere Computing: Mobile Computing Concepts and Technology, Kluwer Academic Publishers 1999.**
6. **George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems: Concepts and Design Third Edition Addison-Wesley, Pearson Education, 2001.**

7. **Cay S Horstmann and Gary Cornell, Java 2 Vol I and II-Sun Micro Systems-2001**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:
After successful completion of the course, a student should be able to:

1. Get verse with the basic terminologies of distributed computing systems.
2. Know the distributed operating system and its implications.
3. Understand the mechanisms of high performance computing.
4. Get familiar with working mechanisms of contemporary distributed systems.

CSE423C GREEN COMPUTING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. Give an account of the concepts pertaining to Green computing
2. Give an account of standards and certifications related to sustainable computing products
3. Relate Green computing to sustainable development
4. Discuss how the choice of hardware and software can facilitate a more sustainable operation

UNIT-I

Definition of the term, Origins, Fundamentals, Regulations and industry initiatives- Government, Industry. approaches to green computing- Middleware Support, Compiler Optimization, Product longevity.

UNIT-II

Algorithmic efficiency, High performance computing, Sustainable computing, Resource allocation, Virtualization, Server Consolidation.

UNIT-III

Terminal servers, Power management, Operating system support, Power supply, Storage, Video card, Display, Tools for monitoring.

UNIT-IV

Green mobile, optimizing for minimizing battery consumption, Web, Temporal and Spatial Data Mining Materials recycling, Telecommuting, metrics for green computing.

Text Book:

Green Computing and Green IT Best Practices on Regulations and Industry Initiatives, Virtualization, Power Management, Materials Recycling and Telecommuting by Jason Harris, Emereo Publishing.

TEXT/REFERENCE BOOKS:

1. **Green Data Center: The steps for the journey by A. Galea, M. Schafer, M. Ebbers, IBM Press.**
2. **The Greening of IT: How companies can make a difference for the environment by John Lamb, IBM Press**
3. **Green Computing: Large-Scale Energy Efficiency by Wu-chun Feng, Virginia Polytechnic Institute and State University, Blacksburg, USA (Eds.), CRC Press**
4. **Green Computing with Emerging Memory: Low-Power Computation for Social Innovation by Kawahara, Takayuki; Mizuno, Hiroyuki (Eds.), Springer Press**
5. **Sustainable ICTs and Management Systems for Green Computing by Wen-Chen Hu (University of North Dakota, USA) and Naima Kaabouch (University of North Dakota, USA), IGI Global Press**
6. **Green IT for Sustainable Business Practice: A Foundation Guide by Mark O'Neill, British informatics Society Limited.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:
After successful completion of the course, a student should be able to:

1. Get verse with the concepts pertaining to Green computing
2. Get an understanding of standards and certifications related to sustainable computing products
3. Relate Green computing to sustainable development
4. Understand the hardware and software choices for facilitating in sustainable operations.

CSE425C SOFTWARE AGENTS

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. List the defining characteristics of an intelligent agent and how an agent differs from an object.
2. Understanding Agent architectures at Micro and Macro level.
3. Understanding how multi agents interact using pure and mixed strategy, Nash equlibria; zero-sum and other interactions; how cooperation occurs in the Prisoner's dilemma.
4. Understanding allocation of scarce resources through auction types; combinatorial auctions and winner determination.

UNIT- I

Agents Introduction:-

Agents Definition:- **Autonomy vs. Agency,** Agent vs Object - Mobile Agents - Agent Programming Paradigms - Frameworks - Agent Reasoning-Mobile Agent Context-Description-Components-Features-Life Cycle.

UNIT- II

Agent Communication, Collaboration, and Mobility:-

Agent Communication Languages-Interaction between agents- Reactive Agents- Cognitive Agents – Rational Agents-Interaction protocols - Agent coordination - Agent negotiation - Agent Cooperation - Agent Organization.

UNIT- III

Mobile Agents Models and Framework:- Standardization and Evolution,

Generating Useable Metrics-Evaluating Semantic Alignment -Evaluating System Agility- Evaluating Loose Coupling- Survey of Mobile Agent System: JADE, SPRINGS, Voyager, Jini, Aglets, Choosing a Mobile Agent Framework.

UNIT- IV

Agent Security Issues:– Threats in Mobile Agents Security – Mobile Agent Threat Models- Protecting Agents against Malicious Hosts - Untrusted Agent -Black Box Security - Authentication for agents - Security issues for aglets.

TEXT/ REFERENCES BOOKS:

1. **Bigus & Bigus, " Constructing Intelligent agents with Java ", Wiley, 1997.**
2. **Bradshaw, " Software Agents ", MIT Press, 2000.**
3. **Russel & Norvig, " Artificial Intelligence: a modern approach ", Prentice Hall, 1994.**
4. **Danny Lange & Mitsuru Oshima, Programming and Deploying Java Mobile Agents with Aglets, Addison-Wesley, 1998,**

5. **Richard Murch, Tony Johnson, " Intelligent Software Agents ", Prentice Hall, 2000.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After completing the course the students will be able to:

1. Understand resource allocation via Bargaining
2. Understand FIPA, Abstract Architecture, Reference Model, Agent Communication Standards
3. Understand integration of agents applications with agents support technologies like Web Services Architecture, Java Enterprise Architecture
4. Use any Agent Development Environment to develop the project.

CSEH403C CYBER FORENSICS AND CYBER LAWS

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To learn the overview of cybercrime.
2. To learn the issues of cybercrime.
3. To learn the various methods to investigate cybercrime and learn about digital forensics.
4. To understand the laws and acts behind.

UNIT I

Introduction: Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime, Social Engineering, Categories of Cyber Crime, Property Cyber Crime. Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses.

UNIT-II

Introduction to Digital Forensics: Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics.

UNIT III

Introduction to Cyber Crime Investigation Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, Email Recovery, Hands on Case Studies, Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT IV

Cyber Laws and Ethics: Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies. Digital, Indian IT Act

TEXT/REFERENCE BOOKS:

1. **Bernadette H Schell, Clemens Martin, Cybercrime, ABC , CLIO Inc, California, 2004.**
2. **Understanding Forensics in IT , NIIT Ltd, 2005.**
3. **Nelson Phillips and Enfinger Steuart, Computer Forensics and Investigations, Cengage Learning, New Delhi, 2009.**
4. **Kevin Mandia, Chris Prosise, Matt Pepe, Incident Response and Computer Forensics, Tata McGraw -Hill, New Delhi, 2006.**
5. **Robert M Slade, Software Forensics, Tata McGraw - Hill, New Delhi, 2005.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines AICTE Examinations reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

Students should be able:

1. To have various ideas about cybercrime.
2. To have knowledge of the various issues of cybercrime.
3. To investigate and find the cybercrime.
4. To have clear idea of the various laws and acts.

CSE441C MULTIMEDIA TECHNOLOGY

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives

1. To understand the characteristics of different multimedia systems.
2. To identify the encoding and quantization mechanisms for images.
3. To explore the audio and video processing mechanisms.
4. To know the practical applications of multimedia systems.

UNIT-I

Basics of Multimedia Technology: Computers, communication and entertainment; multimedia an introduction; framework for multimedia systems; multimedia devices; CD- Audio, CD-ROM, CD-I, presentation devices and the user interface; multimedia presentation and authoring; professional development tools; LANs and multimedia; internet, World Wide Web & multimedia distribution network-ATM & ADSL; multimedia servers & databases; vector graphics; 3D graphics programs; animation techniques; shading; anti aliasing; morphing; video on demand.

UNIT-II

Image Compression & Standards: Making still images; editing and capturing images; scanning images; computer color models; color palettes; vector drawing; 3D drawing and rendering; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive lossless coding; JPEG performance; overview of other image file formats as GIF, TIFF, BMP, PNG etc.

UNIT-III

Audio & Video: Digital representation of sound; time domain sampled representation; method of encoding the analog signals; subband coding; fourier method; transmission of digital sound; digital audio signal processing; stereophonic & quadraphonic signal processing; editing sampled sound; MPEG Audio; audio compression & decompression; brief survey of speech recognition and generation; audio synthesis; musical instrument digital interface; digital video and image compression; MPEG motion video compression standard; DVI technology; time base media representation and delivery.

UNIT-IV

Virtual Reality: Applications of multimedia, intelligent multimedia system, desktop virtual reality, VR operating system, virtual environment displays and orientation making; visually coupled system requirements; intelligent VR software systems. Applications of environment in various fields.

TEXT /REFERENCE BOOKS:

1. **An introduction, Villamil & Molina, Multimedia Mc Milan, 1997**
2. **multimedia: Sound & Video, Lozano, 1997, PHI, (Que)**
3. **Multimedia: Production, planning and delivery, Villamil & Molina,Que, 1997**
4. **Multimedia on the PC, Sinclair,BPB**
5. **Multimedia: Making it work, Tay Vaughan, fifth edition, 1994, TMH.**
6. **Multimedia in Action by James E Shuman, 1997, Wadsworth Publ.,**
7. **Multimedia in Practice by Jeff coate Judith, 1995,PHI.**

8. Multimedia Systems by Koegel, AWL
9. Multimedia Making it Work by Vaughar, etl.

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:
After successful completion of the course, a student should be able to:
1. Get familiar with the characteristics of different multimedia systems.
2. Learn the encoding and quantization mechanisms for images.
3. Understand the audio and video processing mechanisms.
4. Learn the practical applications of multimedia systems.

CSE443C SOFT COMPUTING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
2. To implement soft computing based solutions for real-world problems.
3. To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
4. To provide students a hand-on experience on MATLAB to implement various strategies.

UNIT-I

Introduction to soft computing:- Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics.

UNIT-II

Fuzzy Logic:- Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functisons: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-III

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 & Matlab:- Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition. Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

TEXT AND REFERENCE BOOKS:

1. **George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications",PHI**
2. **Satish Kumar, "Neural Networks: A classroom approach" Tata McGrawHill.**
3. **Haykin S., "Neural Networks-A Comprehensive Foundations",PHI**
4. **Anderson J.A., "An Introduction to Neural Networks",PHI**
5. **M.Ganesh, "Introduction to Fuzzy sets and Fuzzy Logic" PHI.**
6. **N P Padhy and S P Simon, " Soft Computing with MATLAB Programming", Oxford University Press.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After completion of course, students would be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent Machines.
2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
3. Apply genetic algorithms to combinatorial optimization problems.
4. Evaluate and compare solutions by various soft computing approaches for a given problem.

CSE445C SOFTWARE MEASUREMENTS & METRICS

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To understand the characteristics of the different performance measurement techniques of software systems.
2. To identify the metrics and attributes for measuring the performance of software systems.
3. To explore the implications of reliability mechanisms.
4. To provide the knowledge of component based systems and dynamic metrics.

UNIT-I

Basics of measurement:- Measurement in everyday life, measurement in software engineering, scope of software metrics, representational theory of measurement, measurement and models, measurement scales, meaningfulness in measurement, goal-based framework for software measurement, classifying software measures, determining what to measure, software measurement validation, empirical investigation, types of investigation, planning and conducting investigations.

UNIT-II

Software: - Metrics data collection and analysis: What is good data, how to define the data, how to collect the data, how to store and extract data, analyzing software-measurement data, frequency distributions, various statistical techniques. **Measuring internal product attributes**: Measuring size, aspects of software size, length, functionality and complexity, measuring structure, types of structural measures, control-flow structure, and modularity and information flow attributes, data structures.

UNIT-III

Measuring external product attributes: Modeling software quality, measuring aspects of software quality, software reliability, basics of software reliability, software reliability problem, parametric reliability growth models, predictive accuracy, recalibration of software reliability growth predictions, importance of operational environment, wider aspects of software reliability.

Resource measurement: Measuring productivity, teams, tools, and methods.

UNIT-IV

Metrics for object-oriented systems: The intent of object-oriented metrics, distinguishing characteristics of object-oriented metrics, various object-oriented metric suites LK suite, CK suite and MOOD metrics.

Dynamic Metrics: Runtime Software Metrics, Extent of Class Usage, Dynamic Coupling, Dynamic Cohesion, and Data Structure Metrics.

Metrics for component-based systems: The intent of component-based metrics, distinguishing characteristics of component-based metrics, various component-based metrics.

TEXT/REFERENCE BOOKS:

1. **Software Metrics: A rigorous and Practical Approach by Norman E. Fenton and Shari Lawrence Pfleeger, International Thomson Computer Press (1997) 2nd ed.**
2. **Applied Software Measurement by Capers Jones, McGraw Hill (2008).**
3. **Object-Oriented Software Metrics by Mark Lorenz, Jeff Kidd, Prentice Hall (1994).**
4. **Practical Software Metrics For Project Management And Process Improvement byRobert B Grady, Hewlett Packard Professional Books (2004) 1st ed.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, a student should be able to:

1. Get familiar with the performance measurement techniques of software systems.
2. Understand the metrics and attributes for measuring the performance of software systems.
3. Know the implications of reliability mechanisms.
4. Learn the component based systems and importance of dynamic metrics.

CSEH401C BLOCKCHAIN TECHNOLOGY AND APPLICATIONS

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To get acquainted with distributed computing,
2. To create distributed and replicated ledger of events.
3. To study the security and privacy concerns.
4. To know about applications of blockchain.

UNIT- I

Distributed System concepts: Need of distributed record keeping, Modeling faults and adversaries, Byzantine Generals problem, distributed consensus and atomic broadcast, Byzantine Models of fault-tolerance , Consensus algorithms and their scalability problems, reason for Blockchain based cryptocurrency, Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.

UNIT- II

Hyperledger: Hyperledger-Fabric fundamentals: Nodes, channels, components in a blockchain solution, Hyperledger transaction flow, participants identities & access control, Hyperledger Fabric blockchain creation, the plug and play platform and mechanisms in permissioned blockchain, Exploring Hyperledger frameworks

UNIT -III

Privacy &Security issues: Zero Knowledge proofs and protocols in Blockchain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves - Zcash , Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – such as Sybil attacks, selfish mining, attacks - advent of algorand, and Sharding based consensus algorithms, Authenticated Agreement.

UNIT IV

Applications: Corda, Uses of Blockchain in E-Governance and other contract enforcement mechanisms, Land Registration, cyber security, integrity of information, supply chain, Medical Information Systems, Decentralized Internet of Things, Domain Name Service and prospects of Blockchain

TEXT/REFERENCES BOOKS

1. **Blockchain Technology: Cryptocurrency and Applications by S. Shukla, M. Dhawan, S. Sharma and S. Venkatesan, Oxford University Press, 2019.**
2. **Blockchain: The Blockchain for Beginnings, Guide to Blockchain Technology and Blockchain Programming by Josh Thompson, Create Space Independent Publishing Platform, 2017.**
3. **A Step by Step guide to Enterprise Blockchain with Hyperledger Fabric: Develop De-centralized applications with Hyperledger Fabric by Mustafa Husain , Sandeep Kumar, ebook**
4. **The Science of the Blockchain by Wattenhofer ebook**

Note:
In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

At the end of the course, students will develop understanding for:

1. Hyperledger and transaction flow.
2. Authenticated agreement
3. Privacy and security issues pertaining to blockchain
4. Blockchain in IoT and supply chain.

CSEH405C MATHEMATICAL AND STATISTICAL TECHNIQUES

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand mathematical foundation of Data science and Statistical Modelling
2. To analyze data using Statistics and Probability techniques
3. To understand the basic concepts sampling, distributions and hypothesis testing techniques
4. To understand of the key techniques and theory used in visualization, including data models, graphical perception and functions used for analysis of various data distributions.

Unit I

Statistics: Definition and scope, concepts of statistical population and sample, Data: quantitative and qualitative, Scales of measurement: nominal, ordinal, interval and ratio, Frequency distribution, Measures of Central Tendency: Mean, Median, Mode, Measures of Dispersion: range, mean deviation, standard deviation, coefficient of variation, Gini's Coefficient, Lorenz Curve. Moments, skewness and kurtosis, Quantiles, Box Plot. Outlier Detection, Quantile-Quantile Plot.

Unit-II

Inferential statistics: The Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, Sampling distributions (Chi-Square, t, F, z). Test of Hypothesis- Testing for Attributes – Mean of Normal Population – One-tailed and two-tailed tests, F-test and Chi-Square test -- Analysis of variance ANOVA – One way and two way classifications.

Unit-III

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability–classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.

Unit-IV

Random variables: Random variables: discrete random variables, probability mass function (p.m.f) and Cumulative Distribution Function (c.d.f), statement of properties of p.m.f, illustrations and properties of random variables, Two dimensional random variables: discrete type, joint, marginal and conditional p.m.f and c.d.f., statement of properties of c.d.f, independence of variables, trinomial distribution.

Textbooks/Reference books:

1. **Sheldon Ross, Introduction to Probability and Statistics for Engineers, 5/e (2014), Elsevier**
2. **Morris H. DeGroot and Mark J. Schervish, Probability and Statistics (4/e)(2012), AddisonWesley.**
3. **Blitzstein and Hwang, Intoduction to Probability (2015), CRC Press.**
4. **William Feller, An Intoroduction to Probability, (3/e) (2008), Volume 1, Wiley.**
5. **Freedman, Pisani, Purves, Statistics (4/e)(2014), W. W. Norton & Company.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcome:

After completing the course the student will be able to

1. Perform simple statistics methods for data analysis
2. Perform statistical analysis of data using Inferential statistics and test hypothesis
3. Perform probability models and evaluate event probabilities, conditional probability and Bayes theorem
4. Find relations between random variables

CSE481C PROFESSIONAL TRAINING SEMINAR (LEVEL-3)

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
-	-	2	2	**Examination**	:	**50 Marks**
				Total	:	**50 Marks**

Course Objectives:

1. Acquire knowledge of the industry in which the internship is done.
2. Apply knowledge and skills learned in the classroom in a work setting.
3. To decide the future application areas of Computer Science and Engineering.

At the end of 6th semester each student would undergo four weeks Professional Training in an Industry/ institute/ Professional / Organization/ Research Laboratory etc. with the prior approval. The student has to submit a typed report in the department along with a certificate from the organization. The typed report should be in a prescribed format.

The report will be evaluated in the 7th Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning. Teachers associated with evaluation work will be assigned 2 periods per week load.

Course Outcomes:

After completing the course the students will have:

1. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. An ability to work in a multidisciplinary team
3. An ability to identify, formulate, and solve engineering problems
4. An understanding of professional and ethical responsibility.

CSE483C PROJECT-I

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits	Class Work	:	50 Marks
-	-	8	4	Examination	:	100Marks
				Total	:	150 Marks

Course Objectives:

1. To align student's skill and interests with a realistic problem or project
2. To understand the significance of problem and its scope.
3. Students will make decisions within a framework

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. will be evaluated through a panel of examiners consisting of the following:

Chairman of Department	Chairperson
Project coordinator	Member Secretary
Respective project supervisor	Member

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).
Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.
The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Course Outcomes:

After completing the course the students will be able to:

1. Develop the professional quality of employing technical knowledge obtained in the field of Engineering & Technology.
2. Design and make analysis augmented with creativity, innovation and ingenuity.
3. Develop an understanding on how to work in actual industry environment.
4. Utilise the technical resources and write the technical report.

CSEH481C PROJECT BASED ON SPECIALIZATION

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits	Class Work	:	25 Marks
-	-	4	2	Examination	:	75 Marks
				Total	:	100 Marks

Course Objectives:

1. To align student‟s skill and interests with a realistic problem or project
2. To understand the significance of problem and its scope.
3. Students will make decisions within a framework

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department	Chairman
Project coordinator	Member Secretary
Respective project supervisor	Member

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).
Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.
The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Course Outcomes:

After completing the course the students will be able to:

1. Develop the professional quality of employing technical knowledge obtained in the field of Engineering & Technology.
2. Design and make analysis augmented with creativity, innovation and ingenuity.
3. Develop an understanding on how to work in actual industry environment.
4. Utilise the technical resources and write the technical report.

EEH452C ELECTRICAL AND HYBRID VEHICLES
(OPEN ELECTIVE-III)

L	T	P	Credits			
3	-	-	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

1. Understand the basic concept and history of EV and HEV.
2. Understand the models to describe hybrid vehicles and their performance.
3. Understand the different possible ways of energy storage.
4. Understand the different strategies related to energy management systems.

UNIT I

Introduction: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern electric vehicles on energy supplies. Electric Vehicle Composition and Configurations, Basic concept of hybrid Electric vehicle, HEV configuration types – series, parallel, series-parallel and complex hybrid, Power flow control.

UNIT II

Electric Propulsion: major requirements of EV motor drive, characteristics and control of DC motor, Induction motor, Switched Reluctance motor and Permanent Magnet motor, power converters devices/topology, control hardware, software and strategy vehicle, power source characterization, transmission characteristics.

UNIT III

Energy Storage: Introduction to energy storage requirements in Hybrid and Electric Vehicles, Energy sources, Battery based energy storage and its analysis, Fuel fell based energy storage and its analysis, super capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis.

UNIT IV

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies. Plug-in electric vehicles, Vehicle to grid (V2G) and Grid to vehicle (G2V) fundamentals

Text / References:

1. **C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons, 2011.**
2. **S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management Strategies", Springer, 2015.**
3. **M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design", CRC Press, 2004.**
4. **T. Denton, "Electric and Hybrid Vehicles", Routledge, 2016.**

NOTE:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students: Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

MGT401C ENTREPRENEURSHIP
(OPEN ELECTIVE-III)

L	T	P	
3	0	0	**External Marks: 75**
			Internal Marks: 25
			Total Marks : 100
			Duration of Examination: 3 Hours

Course Objective:

The main objective of the course is to expose the students to the growth of entrepreneurship in developing countries and acquaint with the establishment and running of a new enterprise

Unit-I

Entrepreneurship: Concept and Definitions of Entrepreneur & Entrepreneurship; Classification and Types of Entrepreneurs; Traits/Qualities of an Entrepreneurs; Entrepreneurship's Challenges; Factor affecting Entrepreneurial Growth – Economic &Non-Economic Factors; Entrepreneur Vs. Intrapreneur .EDP Programmes.

Unit-II

Innovation Technology Management: Entrepreneurial Opportunity Search and Identification; recognition of a good business opportunity; Conducting Feasibility Studies. Business Plan: Purpose of Business Plan; Contents of Business Plan; Presenting of Business Plan; Why Business plan Fails.

Unit –III

Indian Models in Entrepreneurship: Social Entrepreneur: Introduction; Characteristics, Need, Types and Motivations of Social Entrepreneur. Women Entrepreneurship: Role & Importance, Profile of Women Entrepreneur, Problems of Women Entrepreneurs, Women Entrepreneurship Development in India.

Unit-IV

Developments of Entrepreneur: Micro, Small and Medium Enterprises: Concept & definitions; Role & Importance; MSMED Act 2006, Current Scheme of MSME- Technology Up-gradation Scheme , Marketing Assistance Scheme ,Certification Scheme, Credit- rating scheme , Problems facing MSME.
Financing the venture: Introduction, features and process of Venture Capital, Funding from Banks.

Recommended Books

1. **Roy Rajeev, Entrepreneurship 2/e, Oxford University Press.**
2. **Charantimath, Poornima, "Entrepreneurship Development and Small Business Enterprises", Pearson Education, New Delhi.**

Suggested Readings

1. **Roy Rajeev, Entrepreneurship 2/e, Oxford University Press.**
2. **Charantimath, Poornima, "Entrepreneurship Development and Small Business Enterprises", Pearson Education, New Delhi.**
3. **Norman M. Scarborough, "Essentials of Entrepreneurship & Small Business Management", PHI, New Delhi.**
4. **Vasant Desai, "Entrepreneurial Development and Management", Himalaya Publishing House, New Delhi.**
5. **Kumar Arya, "Entrepreneurship: creating and leading an entrepreneurial organization", Seventh Impression, Pearson Education.**
6. **Holt, "Entrepreneurship: New Venture Creation", Prentice Hall, New Delhi.**

7. **Hisrich, Robert D., Michael Peters and Dean Shephered, "Entrepreneurship", Tata McGraw Hill, New Delhi.**
8. **Bridge, S et al., "Understanding Enterprise: Entrepreneurship and Small Business", Palgrave Publication.**
9. **Donald F. Kuratko, "Entrepreneurship: Theory, Process, and Practice", South Western College Publications.**

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students: Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Course Outcomes:

At the end of the course:

1. Students will be able to understand the concept of entrepreneurship, traits required to become an entrepreneur.
2. Students will be able to design and formulate the basic principles of business plans, they can choose and present their business plan
3. Students will know about the different types of entrepreneur
4. Students will be aware of the role of MSME in the development of Small Scale industries.

ME452C FUNDAMENTALS OF SUSTAINABLE MANUFACTURING
(OPEN ELECTIVE-III)

L	T	P	Credits			
3	0	--	3	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Course Outcomes:

At the end of this course, students will be able to

1. Summarize sustainability issues and driversof sustainability.
2. Understand various standards for Environmental Impact Assessment.
3. Apply various tools and technique to access manufacturing sustainability.
4. Comprehend sustainability advantages associated with various manufacturing initiatives.

UNIT I

Introduction: Introduction to sustainability and drivers for sustainable development and sustainable Sustainable Manufacturing - Concept of Triple bottom line, Environmental, Economic and Social Dimensions of Sustainability, Sustainable Product Development – Various Phases.

UNIT II

Tools and Techniques: Environmental Conscious Quality Function Deployment, Life cycle assessment, Design for Environment, R3 and R6 cycles, loop production systems, Reverse supply chain, product acquisition management Design for Disassembly.

UNIT III

EIA Standards: CML, EI 95 and 99, ISO 14001 EMS and PAS 2050 standards, Environmental Impact parameters Energy in manufacturing (assessment and minimization)the
Design for recycling: Eco friendly product design methods – Methods to infuse sustainability in early product design phases

UNIT IV

Sustainability Assessment: Concept, Models and Various Approaches, Toxic substances in industry, Product Sustainability and Risk/Benefit assessment– Corporate Social Responsibility, Industry cooperation for reducing Carbon footprint
Green Manufacturing: Dry and near-dry machining, edible oil-based cutting fluids, cryogenic machining, improving work environment, of lean manufacturing, Lean techniques for green manufacturing and strategies for waste reduction in green manufacturing.

Textbooks:

1. **G. Atkinson, S. Dietz, E. Neumayer —Handbook of Sustainable Manufacturing‖. Edward Elgar Publishing Limited, 2007.**
2. **D. Rodick, Industrial Development for the 21st Century: Sustainable Development Perspectives, UN New York, 2007.**

Reference Books

1. **P. Lawn, Sustainable Development Indicators in Ecological Economics, Edward Elgar Publishing Limited.**
3. **S. Asefa, The Economics of Sustainable Development, W.E. Upjohn Institute for Employment Research, 2005.**

Notes:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

CHE459C : NANOSCIENCE AND NANOTECHNOLOGY
(OPEN ELECTIVE-III)

L	T	P	Credits			
3	0	--	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To initiate the student in the area of development of new materials / nanomaterials for novel applications and devices.
2. To impart foundational knowledge of nanoscience and related fields.
3. To make the students acquire an understanding of the analytical techniques in nanoscience and nanotechnology fields.
4. To help them understand in broad application areas of nanoscienceand nanotechnology in engineering.

UNIT-I

Types of materials; bonding in materials; crystal structures and defects; amorphous materials; origins of properties of materials; Effect of nanostructures on properties of materials.

The science of materials – materials science; Historical use of nanoparticles; discovery of the carbon nanotubes; fullerenes; nanostructured materials

UNIT-II

Particle-wave duality; de-Broglie waves; Schrodinger equation in 1-Dimension; Superposition; Energy eigenstates; Interpretation of wave function; Fermions and Bosons; Electron density of states; Energy bandgaps; Fermi energy; Excitons and Bohr radius.

UNIT-III

AFM; STM; Transport in nanostructures; 0,1 and 2 dimensional nanostructures; Bandgap engineering; Molecular motors; MEMS and NEMS devices. Biomaterials and nano-biotechnology.

UNIT-IV

Synthesis of Nanomaterials – ZnO and Fe_3O_4. Characterization of phases and quantification of phases. Applications of Nanomaterials: In textile industry, in catalytic operations, in energy generation, in energy storage, in environmental remediation and in sensors and devices.

TEXT BOOKS:

1. **NANO:The Essentials Understanding Nanoscience and Nanotechnology, T. Pradeep, Tata McGraw Hill Publishing Company Limited, 2007, 0-07-154830-0.**
2. **Material Science and Engineering, 7thed. , William D. Callister, Johan Wiley & Sons, Inc.**
3. **Nanostructured Materials and Nanotechnology, Hari Singh Nalwa, Academic Press, 2002.**
4. **Nanostructures and Nanomaterials, synthesis, properties and applications., Guozhong Cao, Imperial College Press, 2004.**

REFERENCE BOOKS:

1. **Introduction to Nanoscience, S.M. Lindsay, Oxford University Press, 2010, ISBN: 978–019–954421–9 (Pbk).**
2. **Nanoscience, Hans-Eckhardt Schaefer, Springer, 2010, ISBN 978-3-642-10558-6.**

3. **Chemistry of nanomaterials: Synthesis, Properties and applications. C.N.R. Rao, Achim Muller, A.K. Cheetham, Wiley-VCH, 2004.**

NOTES:

1. Part A: Till academic session 2020-2021:In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting at least one question from each unit.
   Part B: From Academic Session 2021-2022 onwards: For the semester examination, nine questions are to be set by the examiner. Question no. 1, containing 6-7 short answer type questions, will be compulsory & based on the entire syllabus. Rests of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit. All questions will carry equal marks.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Course Outcomes:

After completing this course, students will be able to:

1. Learn about the background on nanoscience and give a general introduction to different classes of nanomaterials.
2. Develop an understanding of the science behind the nanomaterial properties.
3. Apply their learned knowledge to study and characterize nanomaterials.
4. Familiarize themselves with the variety of nanotechnology applications, and know how to approach the synthesis of nanomaterials with a set of desirable properties.

EE454C SMART GRID
(OPEN ELECTIVE-III)

L	T	P	Credits			
3	0	--	3	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

Introduction: Concept of smart grid, smart grid control, Communications and Sensing in a Smart Grid, Hardware Architecture, Software architecture, Protocol detail, application & benefits, PLCs Vs RTUs, IED's, RTU Block diagram, PMU communication interface.

UNIT-II

Cyber Security of the Smart Grid: Smart Grid Threats, Vulnerabilities and Cyber Security Strategies, Cyber Security Environment, False Data Injection and Attacks in Electric Power Grids Cyber-Physical System Security.

UNIT-III

Smart Grid Technologies: Energy Management System, Demand side management: peak clipping, valley filling, load shifting etc., state estimation, load forecasting. Time of the day pricing(TOD), Time of use pricing(TOU).

UNIT-IV

Distributed Generation & Control: Concept of distributed generation, Introduction of various distributed generation sources like wind, solar, fuel-cell, micro-hydro, PHEV's etc., Grid integration and control of distributed generation sources.

TEXT BOOKS:

1. **T. Gönen, Electric Power Distribution System Engineering, McGraw-Hill, 1986. ISBN: 0-8493- 5806-X.**
2. **Distribution System Protection Manual, McGraw-Edison Power Systems, 1990.**
3. **Westinghouse Electric Utility Ref. Book, Vol.3, Distribution Systems, 1965.**
4. **R. E. Brown, Electric Power Distribution Reliability, Marcel Dekker Inc., 2002**

REFERENCE BOOKS:

1. **IEEE Power and Energy Magazine, July/August 2007 Issue**
2. **James Burke, Power Distribution Engineering, Mercel Dekker, 1994.**
3. **A.J. Pansini, Electrical Distribution Engineering McGrawHill, 1983.**
4. **E. Lakervi, E.J.Holmes, Electricity Distribution Network Design, IEE series, 1989.**
5. **J. Gers and E. J. Holmes Protection of Electricity Distribution Networks 2nd Edition.**

NOTE:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students: Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand the features of Smart Grid.
2. Understand to make conventional grid more smart, reliable, and efficient.
3. Understand the technical expertise in the emerging area of smart grid.
4. Understand the concepts of distributed generation.

CSE401C ADVANCED COMPUTER ARCHITECTURE

B. Tech. Semester – VIII (Computer Science and Engg.)

L	T	P	Credits	Class Work	:	25 Marks
3	0	--	3	Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To learn the concept of modern computers along-with performance analysis measures.
2. To understand the architectures of various processor types of processors.
3. To explore the paradigms of memory organization.
4. To understand the concepts of parallelization techniques for processing of instructions.

UNIT-I

Introduction: Elements of modern computers (computing problems, algorithms, hardware, OS, system software); Evolution of computer architecture; Factors affecting system performance; architectural development tracks (Multiple-processor tracks, Multivector & SIMD tracks, Multithread & Dataflow tracks) Conditions of parallelism (Data dependence, Resource dependence, control dependence, Bernstein's Conditions); Hardware & Software parallelism; Program partitioning & Scheduling; Program flow machines (Control flow, Data flow, Demand driven); Parallel processor applications; Speedup performance laws (Amdahl's law, Gustafson's law); Scalability (Goals, Metrics, evolution of scalable architectures, open issues)

UNIT-II

Advanced processor Technology: Design space; Instruction pipelines; Instruction set architecture (RISC, CISC, RISC scalar processors, CISC scalar processors); Superscalar Processors, VLIW architecture; Vector & Symbolic processors; Pipelining: Linear pipeline processors, Nonlinear pipeline processors, Instruction pipeline(pipelined instruction processing, mechanisms for instruction pipelining, dynamic instruction scheduling, branch handling techniques) Parallel & Scalable Architectures: Hierarchical bus system, Crossbar switch & multiport memory, multistage & combining networks; Cache coherence & synchronization mechanisms (cache coherence problem, Snoopy bus protocols, directory based protocols.

UNIT-III

Advanced Memory Technology: Bus system (Backplane bus specification, addressing & timing protocols, Arbitration, Transaction and Interrupt, IEEE futurebus) Cache organizations (Cache addressing models, cache performance issues); Shared memory organizations (Interleaved memory organization, Bandwidth and fault tolerance, memory allocation schemes, Sequential & weak consistency models. Latency hiding techniques.

UNIT-IV

Parallel Models and Languages: Parallel Programming Models (Shared-Variable, Message passing, Data-Parallel, Object-Oriented); Parallel languages & Compilers (language features for parallelism, parallel language constructs, optimizing compilers for parallelism); Code optimization & partitioning (Scalar optimization, Local & Global optimization, Vectorization, code generation & scheduling, Trace scheduling compilation); Parallel programming environments (S/W Tools, Y-MP, Paragon, CM-5 Environments , Visualization & Performance tuning)

TEXT /REFERENCE BOOKS:

1. **Advance Computer Architecture: Parallelism, Scalability, Programmability; 2nd Edition by Kai Hwang & Naresh Jotwani, 2012, TMH.**
2. **Pipelined and Parallel processor design by Michael J. Fiynn – 1995, Narosa.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:
After successful completion of the course, a student should be able to:

1. Have an understanding of concept of modern computers along-with performance analysis measures.
2. Have an ability to identify the architectures of various processor types of processors.
3. Understand the paradigms of memory organization.
4. Understand the concepts of simultaneous processing of instructions.

CSE404C SOFTWARE PROJECT MANAGEMENT

B. Tech. Semester – VIII (Computer Science and Engg.)

L	T	P	Credits			
3	-	-	3	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To explain needs for software specifications and to study different types of software requirements gathering techniques.
2. To convert the requirements model into the design model and demonstrate use of software and user interface design principles.
3. To justify the role of SDLC in Software Project Development and to study risks associated with a project.
4. To generate project schedule and can construct, design and develop network diagram for different type of Projects.

UNIT- I

Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, project as a system, management control, requirement specification, information and control in organization, Project management and CMM.

Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

UNIT- II

Project Evaluation & Estimation:- Cost benefit analysis, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project approacht;, structured methods, rapid application development, water fall-, V-process-, spiral-models. Prototyping, delivery. Albrecht function point analysis.

Project Scheduling:- Objectives of activity planning, project schedule, projects and activities, Identifying activities, sequencing and scheduling activities, network planning model, Network Diagrams, CPM**,** representation of lagged activities, backward and forward pass, identifying critical path, activity throat, shortening project , precedence networks.

Risk Management:- Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values.

UNIT- III

Project Monitoring & control:- identifying resource requirements, scheduling resources, PERT, Gantt Charts, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Error

Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

Managing contracts and people-: Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises.

UNIT- IV

Software quality Assurance and Testing:- Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Clean room process.

Software Project Management Tools:- CASE Tools, Planning and Scheduling Tools, MS-Project.

TEXT/ REFERENCE BOOK:

1. **Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH**
2. **Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH**
3. **Software Project Management, Walker Royce, 1998, Addison Wesley.**
4. **Project Management 2/c. Maylor**
5. **Managing Global software Projects, Ramesh, 2001, TMH.**
6. **S. A. Kelkar, Software Project Management, PHI Publication.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes: After completing the course the students will be able to:

1. Explain needs for software specifications and different types of software requirements gathering techniques.
2. Convert the requirements model into the design model and demonstrate use of software and user interface design principles.
3. Justify the role of SDLC in Software Project Development and identify the risks associated with a project.
4. Generate project schedule and can construct, design and develop network diagram for different type of Projects.

CSE482C PROJECT-II

B. Tech. Semester – VIII (Computer Science and Engg.)

L	T	P	Credits			
-	-	18	9	**Class Work**	**:**	**50 Marks**
				Examination	**:**	**100Marks**
				Total	**:**	**150 Marks**
				Duration of Examination	**:**	**3 Hours**

Course Objectives:

1. To align student‟s skill and interests with a realistic problem or project
2. To understand the significance of problem and its scope.
3. Students will make decisions within a framework

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. will be evaluated through a panel of examiners consisting of the following:

Chairman of Department	Chairperson
Project coordinator	Member Secretary
Respective project supervisor	Member

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).
Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her. Internal evaluation will be carried out four times in a semester.
The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Course Outcomes:

After completing the course the students will be able to:

1. Develop the professional quality of employing technical knowledge obtained in the field of Engineering & Technology.
2. Design and make analysis augmented with creativity, innovation and ingenuity.
3. Develop an understanding on how to work in actual industry environment.
4. Utilise the technical resources and write the technical report.

CSE484C PROFESSIONAL TRAINING (LEVEL-4)

B. Tech. Semester – VIII (Computer Science and Engg.)

L	T	P	Credits			
-	-	-	15	Class Work	:	100 Marks
				Examination	:	250Marks
				Total	:	350 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. Acquire knowledge of the industry in which the internship is done.
2. Apply knowledge and skills learned in the classroom in a work setting.
3. To decide the future application areas of Computer Science and Engineering.

Pre-requisite: Students will have to undergo Professional Training (Level-4) of at least one semester from the industry, institute, research lab, training centre etc. who have CGPA of minimum 7.0 till VI sem. with no backlog will only be permitted to proceed for Professional Training.

In the 8th semester student can opt for Professional Training in an Industry/ Institute/ Professional / Organization/ Research Laboratory etc. with the prior approval and submit a typed report in the department along with a certificate from the organization.
The student will be assigned internal supervisor from the department who will be responsible for internal evaluation and interaction with the industry/place of training. Internal evaluation will be carried out four times in semester.
The final report should be in a prescribed format. The final internal evaluation will be done by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the technical knowledge and exposure of the student towards different processes and the functioning of the organization along with the presentation to demonstrate his/her learning.
Internal supervisor will be assigned 2 periods per week load.

Course Outcomes:

After completing the course the students will have:

1. An ability to apply knowledge of mathematics, science, and engineering.
2. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
3. An ability to function on multidisciplinary teams and to identify, formulate, and solve engineering problems.
4. An understanding of professional and ethical responsibility.