

Academic Regulations
Program structure & Detailed Syllabus
2017

For
MASTER OF TECHNOLOGY
Computer Science & Engineering (CSE)
(Applicable For Batches Admitted From 2017 – 2018)



VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)

DUVVADA - VISAKHAPATNAM – 530 049

(An Autonomous Institute, Accredited by NAAC, Affiliated to JNTUK, Kakinada, AP)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)

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ACADEMIC REGULATIONS

(VR 17)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY (AUTONOMOUS)
VISAKHAPATNAM

ACADEMIC REGULATIONS for M. Tech. (Regular)

(Applicable for the batches admitted from 2017 onwards)

The selection for category A and B seats shall be as per Govt. of Andhra Pradesh rules.

1. Award of M. Tech. degree

A student will be declared eligible for the award of the M. Tech. Degree if he/she fulfills the following academic regulations.

Pursued a course of study for not less than two academic years and not more than four academic years.

Candidate has to register for 80 credits and shall secure 80 credits with all courses.

Students who fail to register for their two years course of study within four years or fail to acquire the 80 credits for the award of the degree within four academic years from the year of their admission shall forfeit their seat in M. Tech course and their admission shall stand cancelled.

2. Courses of Study

The following courses of study are offered at present for specialization in the M. Tech. Course.

Specialization Code	Specialization	Department
15	Machine Design (MD)	Mechanical Engineering (ME)
25	Software Engineering (SE)	Computer Science & Engineering (CSE)
38	Digital Electronics & Communication Systems (DECS)	Electronics & Communication Engineering (ECE)
40	Information Technology (IT)	Information Technology (IT)
42	Power & Industrial Drives (P & ID)	Electrical & Electronics Engineering (EEE)
58	Computer Science & Engineering (CSE)	Computer Science & Engineering (CSE)
70	Electronics & Communication Engineering (ECE)	Electronics & Communication Engineering (ECE)

And any other courses as approved by the authorities of the University from time to time.

3. Registration

A student shall register for courses in each semester as per the courses offered by the concerned department.

4. Curricular Program

The Curriculum of the two year M. Tech Course has been designed to achieve a healthy balance between theory & lab hours, industry experience and to develop technical skills required for a career in the industry or a career in research.

5. Distribution and Weightage of Marks

5.1. Theory (100 Marks)

5.1.1. For the theory courses, 60 marks shall be awarded based on the performance in the end Semester Examinations, 40 marks based on the Internal Evaluation. Internal Evaluation is made based on the average of the marks secured in two mid-term examinations.

5.1.2. First mid-term examination is conducted after 8 weeks from the commencement of the semester and the second mid-term examination, after 8 weeks from the Mid-I, at the end of the semester.

5.1.3. The duration for conducting each mid-term examination is two hours. Each theory question paper comprises 4 questions. First mid-term examination shall be from first two and half units of the syllabus. The second mid-term examination is from next two and half units of the syllabus.

5.1.4. End examinations will be conducted for duration of three hours, out of 8 questions, 5 are to be answered.

5.2. Lab (100 Marks)

5.2.1. For the evaluation of lab, 60 marks shall be awarded based on the performance in the End Semester Examinations and 40 marks shall be awarded based on the day to day performance and internal tests.

5.2.2. Out of the 40 marks, 30 marks are allocated for day to day performance of the student and 10 marks are allocated for internal test.

5.2.3. External Laboratory examinations for M. Tech courses must be conducted with two Examiners. Laboratory class teacher acts as internal examiner and external examiner shall be appointed by the Chief Superintendent of Examinations from the panel of experts recommended by the HOD.

5.3. Technical Seminar (50 Marks)

5.3.1. For Technical Seminar, a student shall collect the literature and critically review on a topic relevant to the program. The report is to be submitted in the department and oral presentation is to be made before the committee constituted by the Head of the department for 50 marks. There is no external evaluation.

5.4. Comprehensive Exam (100Marks)

5.4.1. Comprehensive exam consists of written objective examination for 60 marks and a viva-voce for 40 marks.

5.4.2. The Comprehensive exam aims to assess the student's understanding in various subjects which he / she studied during the M. Tech course of study.

5.4.3. It is totally internal evaluation done by the committee constituted by HOD.

5.5. Project Work/Dissertation

5.5.1. Registration of project work:

A candidate is permitted to register for the project work in the beginning of the second year first semester after successfully completing the first and second semester coursework and respective examinations and fulfill the Project Review Committee (PRC) requirements.

5.5.2. Project Evaluation

Every student has to carry out a project work assigned for 34 credits. Every candidate is allowed to submit thesis or dissertation after the student has passed first and second semester examinations and taken project topic approved by the Project Review Committee (PRC). PRC consists of Head of the Department, PG Coordinator, Project Guide and one senior faculty from the concerned department. PG Coordinator acts as chairperson for the PRC.

- i. In case the project get an acceptable rating, viva-voce exam shall be conducted by a board comprising of the supervisor, head of the department and the external examiner who adjudicated the thesis. The board shall jointly evaluate the candidates work as one of the following:
 - A -Excellent
 - B –Good
 - C-Satisfactory
 - D – Notsatisfactory

However, these grades will not be counted for the calculation of CGPA as the project work is approved/not approved type of course.

- ii. If the project viva-voce performance is unsatisfactory, the candidate shall retake the viva- voce examination only after three months. If he fails to get a satisfactory report at the second viva-voce examination, the candidate has to re-register for the project and complete the project within the stipulated time as decided by the department.

6. Attendance Requirements

- i. It is desirable for a candidate to have 100% attendance in the class in all the courses. However, a candidate shall be permitted to appear for the end semester examination if he/she has a minimum of 75% aggregate attendance in the semester.
- ii. Condonation of shortage of attendance may be considered on Medical grounds, if the student provides the medical certificate to the HOD immediately after he / she recovers from the illness. Medical Certificate submitted afterwards shall not be permitted. Shortage of attendance equal to

or above 65% and below 75% will be condoned on payment of fee as fixed by the competent authority and the student concerned will be permitted to take the end semester examination. This privilege is given to any student only once during the entire program of study.

- iii. Shortage of attendance may be considered for the students who participate in prestigious sports, co and extra-curricular activities if their attendance is in the minimum prescribed limit.
- iv. A student will be promoted to the next semester if satisfies attendance and credits requirement.

7. Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements.

For any course, student is considered to be passed upon securing minimum 40 % marks in the external examination alone and minimum 50% marks from both internal and external examination put together.

8. Supplementary Examinations

There are no supplementary examinations for PG programs separately.

9. Examinations and Evaluation

9.1. General guidelines

- i. All the semester end examinations are conducted for duration of three hours under the supervision of the Chief Superintendent of Examinations.
- ii. For laboratory examinations, the evaluation is done by internal examiner and one external examiner.
- iii. Results shall be announced within 30 days after the completion of the last examination.

9.2. Revaluation

9.2.1. There is a provision for revaluation of theory courses if student fulfils the following norms

i.e., the request for revaluation must be made in the prescribed format duly recommended by the Chief Superintendent of Examinations through Additional Controller along with the prescribed revaluation fee.

9.2.2. The highest marks of the two evaluations will be awarded to the student.

9.3. Challenge Revaluation

If the student is very confident, there is a provision for challenge revaluation for the courses as per the following norms.

- i. Applications for Challenge revaluation for semester end exam have to be submitted within one week from the date of notification of the results.
- ii. The challenge revaluation will be carried out by a three member committee comprising of an external course expert nominated by Principal / Chief Superintendent of Examinations, the faculty member who taught the course chosen by student from the same institute and the third member is the Head of the respective department/faculty nominated by HOD.

- iii. The candidate will forfeit the challenging revaluation fee if the difference in the marks awarded by the committee and the initial awarded marks is not more than 15%. If the difference in marks is more than 15%, the challenge fee will be returned to the candidate. The marks awarded in the Challenge revaluation will be the final.

10. GradingSystem

Absolute grading system shall be followed for the award of grades

Grade Point

It is a numerical weight allotted to each letter grade on a 10-point scale.

Grades and Grade Points

Marks Range for all courses Max:100)	Letter Grade	Level	Grade Point
≥ 90	O	Outstanding	10
≥ 80 to < 90	A	Excellent	9
≥ 70 to < 80	B	Very Good	8
≥ 60 to < 70	C	Good	7
≥ 50 to < 60	D	Satisfactory	6
< 50	F	Fail	0
		Absent	-1
		Withheld	-2
		Malpractice	-3

Computation ofSGPA

The following procedure is to be adopted to compute the Semester Grade Point Average. (SGPA) and Cumulative Grade Point Average (CGPA):

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$\text{SGPA (Si)} = \Sigma(\text{Ci} \times \text{Gi}) / \Sigma \text{Ci}$$

Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

Computation of CGPA

- The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.
- $CGPA = \sum(C_i \times S_i) / \sum C_i$
- Where S_i is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.
- Equivalent Percentage = $(CGPA - 0.75) \times 10$

11. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Tech. Degree, he shall be placed in one of the following three classes:

Class Awarded	CGPA to be secured	Based on CGPA secured from 80 Credits
First Class with Distinction	≥ 7.75 with no subject failures	
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	

12. General Instructions

Where the words 'he', 'him', 'his', occur they imply 'she', 'her', 'hers', also.

The academic regulations should be read as a whole for the purpose of any interpretation.

In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Academic Council is final.

The college may change or amend the academic regulations or syllabi from time to time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

13. Transitory Regulations

The student has to continue the course work along with the regular students of the respective semester in which the student gets re-admission.

The student has to register for substitute / compulsory subjects offered in place of subjects studied earlier.

The mode of internal evaluation and end-semester examinations shall be on par with the regular students, i.e., the student has to follow the mode of internal evaluation and the then question paper model for the end-semester examinations along with the regular students of the respective semester in which the student gets re-admission. The marks secured in the internal and end-semester examinations will be in accordance with the regulations under which the student was first admitted.

For the courses studied under earlier regulations but failed, the student has to appear, pass and acquire

credits from the supplementary examinations as and when conducted. The question paper model shall remain same as the one in which the student took examination during previous regulations.

The promotion criteria based on attendance as well as credits shall be in accordance with the regulations under which the student was first admitted.

All other academic requirements shall be in accordance with the regulations under which the student was first admitted.

Any other clarification the decision of the Principal is final and binding.

Transcripts

After successful completion of the entire program of study, a transcript containing performance of all academic years will be issued as a final record. Partial transcript will also be issued up to any point of study to a student on request, after payment of requisite fee.

The Academic Calendar consisting of instruction period of the program is released for every academic year before the commencement of the class work.

There shall be no program transfers after the completion of the admission process. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

14. Disciplinary Action Guidelines for Malpractices

14.1. For Malpractices identified by squad or special invigilators

Punishments to the candidates will be given as per the above guidelines.

MALPRACTICES RULES		
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN		
EXAMINATIONS		
	Nature of Malpractices/ Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to Appear for the remaining examinations of the subjects of that Semester/year.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the

		subjects of the examination including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the Question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/ Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by sign or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during	Cancellation of the performance in that subject and all other subjects the candidate has

	special scrutiny.	appeared including practical examinations and project work of that semester/ year examinations.
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15. UGC recommended punishment for Ragging

- i. Suspension from attending classes and academic privileges
- ii. Withholding/withdrawing scholarships/fellowship and other benefits.
- iii. Debarring from appearing in any test/examination or other evaluation process
- iv. Withholding results
- v. Debarring from representing the institution in any regional, national or international meet, tournament, and youth festival etc.
- vi. Suspension/expulsion from the hostel
- vii. Cancellation of admission
- viii. Rustication from the institution for period ranging from 1 to 4 semesters.
- ix. Expulsion from the institution and consequent debarring from admission to any other institution for a specified period.
- x. Fine may extend up to Rs. 2.5 lakh.

VR 17 - Program Structure –M.Tech. (CSE)
Department of Computer Science & Engineering

I Year I Semester

S. No	CODE	Name of the Subject	Theory	Practical	credits
1	2058171101	Advanced Data Structures and Algorithm Analysis	3+1	0	3
2	2058171102	Mathematical Foundations of Computer Science	3+1	0	3
3	2058171103	Computer Organization and Architecture	3+1	0	3
4	2058171104	Database Management Systems	3+1	0	3
5	2058171105	Advanced Operating Systems	3+1	0	3
6	2058171106	Data Warehousing And Data Mining	3+1	0	3
7	2058171121	CSE Lab – 1	0	3	2
8	2058171132	Technical Seminar -1	0	0	2
Total Credits					22

I Year II Semester

S. No	CODE	Name of the Subject	Theory	Practical	credits
1	2058171201	Cyber Security	3+1	0	3
2	2058171202	Computer Networks	3+1	0	3
3	2058171203	Big Data Analytics	3+1	0	3
4	2058171204	Advanced Unix Programming	3+1	0	3
ELECTIVE – I					
5	2058171205	Software Engineering	3+1	0	3
6	2058171206	Artificial Intelligence			
7	2058171207	Compiler Design			
8	2058171208	Machine Learning			
ELECTIVE – II					
9	2058171209	Image Processing	3+1	0	3
10	2058171210	Parallel Algorithms			
11	2058171211	Cloud Computing			
12	2058171212	Mobile Computing			

13	2058171221	CSE Lab – 2	0	3	2
14	2058171232	Technical Seminar -2	0	0	2
15	2058171235	Comprehensive Exam	0	0	2
Total Credits					24

II Year I Semester

S.No	CODE	Name of the Subject	Theory	Lab.	Credits
1	2058172138	Project Work(Stage- I)	0	0	16
Total Credits					16

II Year II Semester

S.No	CODE	Name of the Subject	Theory	Lab.	Credits
1	2058172238	Project Work(Stage- II)	0	0	18
Total Credits					18

I Year – I Semester**L P C****Subject Code: 2058171101****3+1 0 3****ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS****UNIT- I:**

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms.

Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT-II:

Searching-Linear and Binary Search Methods. Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. Trees- Binary trees, Properties, Representation and Traversals (DFT, BFT), Expression Trees(Infix,prefix,postfix).Graphs-Basic Concepts , Storage Structures and Traversals.

UNIT- III:

Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT- IV:

Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion .Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT –V:

Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching. Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:

1. Data Structures: A Pseudocode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press.

REFERENCES BOOKS:

1. Data Structures And Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2. Data Structures And Algorithms, 3/e, Adam Drozdek, Cengage.
3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad, S Chand & Co,2009.

I Year – I Semester**Subject Code: 2058171102****L P C****3+1 0 3****MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE****UNIT- I:**

Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

UNIT- II :

Set theory & Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram. Functions: composition of functions, Inverse Function, Recursive Functions, Lattice and its Properties, Pigeon hole Principles and its application. Algebraic structures: Algebraic systems, Examples and general properties, Semi groups and Monoids, groups, sub groups, Definitions, Examples, homomorphism, Isomorphism and related problems.

UNIT- III:

Elementary Combinatorics: Basis of counting, Enumeration of Combinations & Permutations, Enumerating of Combinations & Permutations with repetitions and constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, principles of Inclusion – Exclusion.

UNIT- IV:

Recurrence Relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT- V:

Graph Theory: Representation of Graph, Spanning Trees, BFS, DFS, Kruskals Algorithm, Binary trees, Planar Graphs, Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

TEXT BOOKS:

1. DiscreteMathematical Structures with Applications to computer science J.PTremblery, R.Manohar, TMH
2. Discrete Mathematical for computer Scientists & Mathematicians “ J.L. Molt, A.KandelT.P.Baker, PHI

REFERENCE TEXTBOOKS:

1. Elements of Discrete Mathematics, C L Liu, D P Mohanpatra, TMH
2. Discrete Mathematics, Schaum’s Outlines, Lipschutz, Lipson TMH.
3. Discrete Mathematical Structures, Kolman, Busby, Ross, 6th ed., PHI, 2009

I Year – I Semester**L P C****Subject Code: 2058171103****3+1 0 3****COMPUTER ORGANIZATION AND ARCHITECTURE****UNIT- I:**

Number Systems And Computer Arithmetic Signed And Unsigned Numbers, Addition and Subtraction, Multiplication, Division, Floating Point Representation Logical Operation, Gray Code, BCD Code, Error Detecting Codes. Boolean Algebra, Simplification of Boolean Expressions- Maps.

UNIT- II:

Combinational and Sequential Circuits Decoders, Encoders, Multiplexers, Half and Full Adders, Shift Registers, Flip-Flops, Binary Counters, Memory Unit.

UNIT- III:

Memory Organisation Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory Concept.

UNIT- IV:

ALU Design Addition and Subtraction, Sign and Unsigned Numbers, Multiplication and Division Algorithms, BCD Adders.

UNIT- V :

Input –Output Organisation Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, DMA, Input Output Processor, Serial Communication.

TEXT BOOKS:

1. Computer System Architecture, 3/e, Moris Mano, Pearson/PHI.
2. Micro Processor and Interfacing, 2/e, Douglas V.Hall, TMH.

REFERENCE BOOKS:

1. Digital Logic and Computer Organisation, Rajaraman, Radha Krishnan, PHI.
2. Micro Computer Systems: 8086/8088 family, 2/e, Liu, Gibson, PHI.
3. Computer Organisation and Architecture, 7/e, Stallings, Pearson.

I Year – I Semester**L P C****Subject Code: 2058171104****3+1 0 3****DATABASE MANAGEMENT SYSTEMS****UNIT- I:**

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, History of Database Systems. Introduction to Database design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views – Destroying /altering Tables and Views.

UNIT- II:

Relational Algebra and Calculus: Relational Algebra – Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus. Form of Basic SQL Query – Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators, NULL values – Comparison using Null values – Logical connectives – AND, OR and NOT – Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT- III:

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional

Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

UNIT- IV:

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL. Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log , Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT-V:

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations. Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendblevs.Linear Hashing.

TEXT BOOKS:

1. Database Management Systems, Raghu Ramakrishna, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Database System Concepts, A.Silberschatz, H.F. Korth, S. Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition. RamezElmasri, ShamkantB.Navathe, Pearson Education, 2008.

REFERENCE BOOKS:

1. Database Management System Oracle SQL and PL/SQL,P.K.Das Gupta, PHI.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.

I Year – I Semester**L P C****Subject Code: 2058171105****3+1 0 3****ADVANCED OPERATING SYSTEMS****UNIT - I:**

Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - logical clocks - vector clocks - causal ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms - a comparative performance analysis.

UNIT - II:

Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT - III:

Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT - IV:

Protection and security -preliminaries, the access matrix model and its implementations.- safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard-public key cryptography - multiple encryption - authentication in distributed systems.

UNIT - V:

Multiprocessor operating systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control algorithms - introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

TEXT BOOKS:

- I Mukesh Singhal, Niranjana G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001

REFERENCE BOOKS:

1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003

I Year – I Semester**L P C****Subject Code: 2058171106****3+1 0 3****DATA WAREHOUSING AND DATA MINING****UNIT 1: DATA WAREHOUSING:**

Data warehousing Components –Building a Data warehouse — Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT II: BUSINESS ANALYSIS:

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT III: DATA MINING:

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT IV :ASSOCIATION RULE MINING AND CLASSIFICATION:

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT V : CLUSTERING AND TRENDS IN DATA MINING:

Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods – Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TEXT BOOKS:

1. Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.AULibrary.com

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Aja, “Insight into Data Mining Theory and Practice”, Eastern Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Eastern Economy Edition, Prentice Hall of India, 2006.
4. Daniel T. Larose, “Data Mining Methods and Models”, Wiley-Interscience, 2006.

I Year – I Semester**L P C****Subject Code: 2058171121****0 3 2****CSE LAB 1****Data Structures Programs:**

1. To implement Stacks & Queues using Arrays & Linked Lists
2. To implement Stack ADT, Queue ADT using arrays & Linked Lists
3. To implement Dequeue using Double Linked List & Arrays
4. To perform various Recursive & Non-recursive operations on Binary Search Tree
5. To implement BFS & DFS for a graph
6. To implement Merge & Heap sort of given elements
7. To perform various operations on AVL trees
8. To implement Krushkal's algorithm to generate a min-cost spanning tree
9. To implement Prim's algorithm to generate min-cost spanning tree
10. To implement functions of Dictionary using Hashing

Operating system programs:

1. Program to implement FCFS(First Come First Serve)scheduling Algorithms
2. Program to implement SJF(Shortest Job First)Scheduling Algorithm
3. Program to implement Priority Scheduling algorithm
4. Program to implement Round Robin Scheduling algorithm
5. Program to implement FIFO(First In First Out) Page Replacement Algorithm
6. Program to implement LRU(least Recently used)Page Replacement Algorithm
7. Program to implement LFU(Least Frequently used)Page Replacement Algorithm
8. Write a program to implement how Disk Scheduling is done in operating system
9. Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

I Year – II Semester**L P C****Subject Code: 2058171201****3+1 0 3****CYBER SECURITY****UNIT I:****Introduction:**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II:**Conventional Encryption:**

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III:

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

I Year – II Semester**L P C****Subject Code: 2058171202****3+1 0 3****COMPUTER NETWORKS****UNIT – I:**

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

UNIT – II:

Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing
Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

UNIT – III:

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat

UNIT – IV:

The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation- Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The 802.11 MAC Sublayer Protocol-The 805.11 Frame Structure-Services

UNIT – V:

Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms- Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding.

TEXT BOOKS:

1. Computer Networks, Tanenbaum and David J Wetherall, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, Firouz Mosharraf, McGraw Hill Education

REFERENCE BOOKS:

1. Larry L. Peterson and Bruce S. Davie, “Computer Networks - A Systems Approach” (5th ed), Morgan Kaufmann/ Elsevier, 2011

I Year – II Semester**L P C****Subject Code: 2058171203****3+1 0 3****BIG DATA ANALYTICS****UNIT-I**

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III

Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs

of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

TEXT BOOKS:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss

REFERENCE BOOKS:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, ThilinaGunarathne

SOFTWARE LINKS:

1. Hadoop: <http://hadoop.apache.org/>
2. Hive: <https://cwiki.apache.org/confluence/display/Hive/Home>
3. Piglatin: <http://pig.apache.org/docs/r0.7.0/tutorial.html>

I Year – II Semester**L P C****Subject Code: 2058171204****3+1 0 3****ADVANCED UNIX PROGRAMMING****UNIT-I**

Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT-III

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

UNIT-IV

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The \$? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command. The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

TEXT BOOKS:

- 1.The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
- 2.Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:

1. Unix and shell programmingby B.M. Harwani, OXFORD university press.

I Year – II Semester

L P C

Subject Code: 2058171205

3+1 0 3

SOFTWARE ENGINEERING (Elective – 1)

UNIT-I:

Software and Software Engineering: The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

UNIT-II:

Requirements Analysis and Specification: Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

Software Design: Overview of the Design Process, How to Characterise of a Design? Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

UNIT – III:

Function-Oriented Software Design: Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

UNIT – IV:

Coding And Testing: Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

UNIT – V:

Software Reliability And Quality Management: Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

Computer Aided Software Engineering: Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment

TEXT BOOKS:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGraw Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

REFERENCE BOOKS:

1. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
4. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

I Year – II Semester

L P C

Subject Code: 2058171206

3+1 0 3

ARTIFICIAL INTELLIGENCE (Elective – 1)

UNIT-I:

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI

UNIT-II:

Problem solving: state-space search and control strategies : Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening search, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

UNIT-III:

Logic concepts: Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic

UNIT-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach, 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERENCE BOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George FLugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

I Year – II Semester**L P C****Subject Code: 2058171207****3+1 0 3**

COMPILER DESIGN
(Elective – 1)

UNIT – I

Introduction Language Processing, Structure of a compiler the evaluation of Programming language, The Science of building a Compiler application of Compiler Technology. Programming Language Basics.

Lexical Analysis-: The role of lexical analysis buffering, specification of tokens. Recognitions of tokens the lexical analyzer generator lexical

UNIT –II

Syntax Analysis -: The Role of a parser, Context free Grammars Writing A grammar, top down passing bottom up parsing Introduction to Lr Parser.

UNIT –III

More Powerful LR parser (LR1, LALR) Using Armigers Grammars Equal Recovery in Lr parser Syntax Directed Transactions Definition, Evolution order of SDTS Application of SDTS. Syntax Directed Translation Schemes.

UNIT – IV

Intermediated Code: Generation Variants of Syntax trees 3 Address code, Types and Deceleration, Translation of Expressions, Type Checking. Canted Flow Back patching?

UNIT – V

Runtime Environments, Stack allocation of space, access to Non Local data on the stack Heap Management code generation – Issues in design of code generation the target Language Address in the target code Basic blocks and Flow graphs. A Simple Code generation.

TEXT BOOKS:

1. Compilers, Principles Techniques and Tools. Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman, 2nd edition, pearson, 2007
2. Compiler Design K.Muneeswaran, OXFORD
3. Principles of compiler design, 2nd edition, Nandhini Prasad, Elsebier.

REFERENCE BOOKS:

1. Compiler Construction, Principles and practice, Kenneth C Loudon, CENGAGE
2. Implementations of Compiler, A New approach to Compilers including the algebraic methods, Yunlinsu, SPRINGER

I Year – II Semester

L P C

Subject Code: 2058171208

3+1 0 3

MACHINE LEARNING (Elective – 1)

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, **Models:** the output of machine learning, **Features,** the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning:** The hypothesis space, Paths through the hypothesis space, beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT -IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, and Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

I Year – II Semester**L P C****Subject Code: 2058171209****3+1 0 3**

DIGITAL IMAGE PROCESSING
(Elective -2)

UNIT I:

Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems **DDA line algorithms:** Bresenham's line and circle derivations and algorithms

UNIT II:

2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations-** Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

UNIT III:

Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy

Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

UNIT IV:

Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning, Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT V:

SEGMENTATION: Threshold detection methods, Optimal Thresholding, Edge based Segmentation- Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Merging, Region Splitting, Splitting and Merging, Watershed Segmentation.

Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predictive Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG-MPEG Image Compression methods.

Text Books:

1. Computer Graphics C Version, Donald Hearn, M Paulli Baker, Pearson (Unit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclav Halvok, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)

References:

1. Computer & Machine Vision, Theory, Algorithms, Practicles, E R Davies, Elsevier, 4ed
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier

I Year – II Semester**L P C****Subject Code: 2058171210****3+1 0 3****PARALLEL ALGORITHMS****(Elective – 2)****UNIT1: Introduction:**

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file -system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic ,merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT V: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXT BOOKS:

1. Parallel computing t h e o r y and practice, Michel J.Quinn
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

I Year – II Semester

L P C

Subject Code: 2058171211

3+1 0 3

CLOUD COMPUTING (Elective -2)

UNIT I:

Introduction: Network centric computing, Network centric content, peer-to-peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing

Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT II:

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing

Cloud Computing :Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research

UNIT III:

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades

Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feed back control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2)

Cloud Security: Cloud security risks, security – a top concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks

UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1)

Google: Google App Engine, Google Web Toolkit (Text Book 2)

Micro Soft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, MicrosoftDynamics CRM (Text Book 2)

TEXT BOOKS:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

REFERENCE BOOK:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH

I Year – II Semester

L P C

Subject Code: 2058171212

3+1 0 3

MOBILE COMPUTING (Elective -2)

UNIT- I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT –II

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT –III

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –IV

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT- V

Data Dissemination and Synchronization : Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772

REFERENCE BOOKS:

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, “Mobile Computing, Technology Applications and Service Creation” Second Edition, Mc Graw Hill.
2. UWE Hansmann, Lothar Merk, Martin S. Nocklous, Thomas Stober, “Principles of Mobile Computing,” Second Edition, Springer.

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CSE LAB-2

1. a Study of Unix/Linux general purpose utility command listman,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.

- Study of vi editor.
- Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
- Study of Unix/Linux files system (tree structure).
- Study of .bashrc, /etc/bashrc and Environment variables.

2. Write a C program that makes a copy of a file using standard I/O, and system calls

3. Write a C program to emulate the UNIX ls -l command.

4. Write a C program that illustrates how to execute two commands concurrently with a command pipe.

- Ex: - ls -l | sort

5. Write a C program that illustrates two processes communicating using shared memory

6. Write a C program to simulate producer and consumer problem usingsemaphores

7. Write C program to create a thread using pthreads library and let it run its function.

8. Write a C program to illustrate concurrent execution of threads using pthreads library.

9. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whoisetc. Usage of elementary socket system calls (socket (), bind(), listen(), accept(),connect(),send(),recv(),sendto(),recvfrom()).

10. Implementation of Connection oriented concurrent service (TCP).

11. Implementation of Connectionless Iterative time service (UDP).

12. Implementation of Select system call.

13. Implementation of gesockopt (), setsockopt () system calls.

14. Implementation of getpeername () system call.

15. Implementation of remote command execution using socket system calls.