ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

For
COMPUTER SCIENCE ENGINEERING BRANCH

INFORMATION TECHNOLOGY

JAWAHARLAL NEHRU TECHNOLOGY UNIVERSITY KAKINADA

KAKINADA - 533 003, Andhra Pradesh, India

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ACADEMIC REGULATIONS R13 FOR M. Tech (REGULAR) DEGREE COURSE

Applicable for the students of M. Tech (Regular) Course from the Academic Year 2013-14 onwards

The M. Tech Degree of Jawaharlal Nehru Technological University Kakinada shall be conferred on candidates who are admitted to the program and who fulfil all the requirements for the award of the Degree.

1.0   ELIGIBILITY FOR ADMISSIONS

Admission to the above program shall be made subject to eligibility, qualification and specialization as prescribed by the University from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the qualifying Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University, subject to reservations as laid down by the Govt. from time to time.

2.0   AWARD OF M. Tech DEGREE

2.1   A student shall be declared eligible for the award of the M. Tech Degree, if he pursues a course of study in not less than two and not more than four academic years.

2.2   The student shall register for all 80 credits and secure all the 80 credits.

2.3   The minimum instruction days in each semester are 90.

3.0 A.   COURSES OF STUDY

The following specializations are offered at present for the M. Tech course of study.

1.   M.Tech- Structural Engineering
2.   M.Tech- Transportation Engineering
3.   M.Tech- Infrastructure Engineering & Management
4.   ME- Soil Mechanics and Foundation Engineering
5.   M.Tech- Environmental Engineering
6.   M.Tech-Geo-Informatics
7.   M.Tech-Spatial Information Technology

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8. M.Tech- Civil Engineering
9. M.Tech -Geo-Technical Engineering
10. M.Tech- Remote Sensing
11. M.Tech- Power Electronics
12. M.Tech- Power & Industrial Drives
13. M.Tech- Power Electronics & Electrical Drives
14. M.Tech- Power System Control & Automation
15. M.Tech- Power Electronics & Drives
16. M.Tech- Power Systems
17. M.Tech- Power Systems Engineering
18. M.Tech- High Voltage Engineering
19. M.Tech- Power Electronics and Power Systems
20. M.Tech- Power System and Control
21. M.Tech- Power Electronics & Systems
22. M.Tech- Electrical Machines and Drives
23. M.Tech- Advanced Power Systems
24. M.Tech- Power Systems with Emphasis on High Voltage Engineering
25. M.Tech- Control Engineering
26. M.Tech- Control Systems
27. M.Tech- Electrical Power Engineering
28. M.Tech- Power Engineering & Energy System
29. M.Tech- Thermal Engineering
30. M.Tech- CAD/CAM
31. M.Tech- Machine Design
32. M.Tech- Computer Aided Design and Manufacture
33. M.Tech- Advanced Manufacturing Systems
34. M.Tech-Computer Aided Analysis & Design
35. M.Tech- Mechanical Engineering Design
36. M.Tech- Systems and Signal Processing
37. M.Tech- Digital Electronics and Communication Systems
38. M.Tech- Electronics & Communications Engineering
39. M.Tech- Communication Systems
40. M.Tech- Communication Engineering & Signal Processing
41. M.Tech- Microwave and Communication Engineering
42. M.Tech- Telematics

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43. M.Tech- Digital Systems & Computer Electronics

44. M.Tech- Embedded System

45. M.Tech- VLSI

46. M.Tech- VLSI Design

47. M.Tech- VLSI System Design

48. M.Tech- Embedded System & VLSI Design

49. M.Tech- VLSI & Embedded System

50. M.Tech- VLSI Design & Embedded Systems

51. M.Tech- Image Processing

52. M.Tech- Digital Image Processing

53. M.Tech- Computers & Communication

54. M.Tech- Computers & Communication Engineering

55. M.Tech- Instrumentation & Control Systems

56. M.Tech – VLSI & Micro Electronics

57. M.Tech – Digital Electronics & Communication Engineering

58. M.Tech- Embedded System & VLSI

59. M.Tech- Computer Science & Engineering

60. M.Tech- Computer Science

61. M.Tech- Computer Science & Technology

62. M.Tech- Computer Networks

63. M.Tech- Computer Networks & Information Security

64. M.Tech- Information Technology

65. M.Tech- Software Engineering

66. M.Tech- Neural Networks

67. M.Tech- Chemical Engineering

68. M.Tech- Biotechnology

69. M.Tech- Nano Technology

70. M.Tech- Food Processing

71. M.Tech- Avionics

and any other course as approved by AICTE/ University from time to time.

3.0 B.   **Departments offering M. Tech Programmes with specializations**
             are noted below:

Civil Engg.	1.	M.Tech- Structural Engineering
	2.	M.Tech- Transportation Engineering
	3.	M.Tech- Infrastructure Engineering & Management
	4.	ME- Soil Mechanics and Foundation Engineering
	5.	M.Tech- Environmental Engineering
	6.	M.Tech-Geo-Informatics
	7.	M.Tech-Spatial Information Technology
	8.	M.Tech- Civil Engineering
	9.	M.Tech -Geo-Technical Engineering
	10.	M.Tech- Remote Sensing
EEE	1.	M.Tech- Power Electronics
	2.	M.Tech- Power & Industrial Drives
	3.	M.Tech- Power Electronics & Electrical Drives
	4.	M.Tech- Power System Control & Automation
	5.	M.Tech- Power Electronics & Drives
	6.	M.Tech- Power Systems
	7.	M.Tech- Power Systems Engineering
	8.	M.Tech- High Voltage Engineering
	9.	M.Tech- Power Electronics and Power Systems
	10.	M.Tech- Power System and Control
	11.	M.Tech- Power Electronics & Systems
	12.	M.Tech- Electrical Machines and Drives
	13.	M.Tech- Advanced Power Systems
	14.	M.Tech- Power Systems with Emphasis on High Voltage Engineering
	15.	M.Tech- Control Engineering
	16.	M.Tech- Control Systems
	17.	M.Tech- Electrical Power Engineering
	18.	M.Tech- Power Engineering & Energy System
ME	1.	M.Tech- Thermal Engineering
	2.	M.Tech- CAD/CAM
	3.	M.Tech- Machine Design
	4.	M.Tech- Computer Aided Design and Manufacture
	5.	M.Tech- Advanced Manufacturing Systems
	6.	M.Tech-Computer Aided Analysis & Design
	7.	M.Tech- Mechanical Engineering Design

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ECE	1.	M.Tech- Systems and Signal Processing
	2.	M.Tech- Digital Electronics and Communication Systems
	3.	M.Tech- Electronics & Communications Engineering
	4.	M.Tech- Communication Systems
	5.	M.Tech- Communication Engineering & Signal Processing
	6.	M.Tech- Microwave and Communication Engineering
	7.	M.Tech- Telematics
	8.	M.Tech- Digital Systems & Computer Electronics
	9.	M.Tech- Embedded System
	10.	M.Tech- VLSI
	11.	M.Tech- VLSI Design
	12.	M.Tech- VLSI System Design
	13.	M.Tech- Embedded System & VLSI Design
	14.	M.Tech- VLSI & Embedded System
	15.	M.Tech- VLSI Design & Embedded Systems
	16.	M.Tech- Image Processing
	17.	M.Tech- Digital Image Processing
	18.	M.Tech- Computers & Communication
	19.	M.Tech- Computers & Communication Engineering
	20.	M.Tech- Instrumentation & Control Systems
	21.	M.Tech – VLSI & Micro Electronics
	22.	M.Tech – Digital Electronics & Communication Engineering
	23.	M.Tech- Embedded System & VLSI
CSE	1.	M.Tech- Computer Science & Engineering
	2.	M.Tech- Computer Science
	3.	M.Tech- Computer Science & Technology
	4.	M.Tech- Computer Networks
	5.	M.Tech- Computer Networks & Information Security
	6.	M.Tech- Information Technology
	7.	M.Tech- Software Engineering
	8.	M.Tech- Neural Networks
Others	1.	M.Tech- Chemical Engineering
	2.	M.Tech- Biotechnology
	3.	M.Tech- Nano Technology
	4.	M.Tech- Food Processing
	5.	M.Tech- Avionics

4.0 ATTENDANCE

4.1   A student shall be eligible to write University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

4.2   Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee.

4.3   Shortage of Attendance below 65% in aggregate shall not be condoned.

4.4   Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.

4.5   A prescribed fee shall be payable towards condonation of shortage of attendance.

4.6   A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

5.0 EVALUATION

The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

5.1   For the theory subjects 60 marks shall be awarded based on the performance in the End Semester Examination and 40 marks shall be awarded based on the Internal Evaluation. The internal evaluation shall be made based on the **average** of the marks secured in the two Mid Term-Examinations conducted-one in the middle of the Semester and the other immediately after the completion of instruction. Each mid term examination shall be conducted for a total duration of 120 minutes with 4 questions (without choice) each question for 10 marks. End semester examination is conducted for 60 marks for **www.FirstRanker.com** answered out of 8 questions.

5.2   For practical subjects, 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 as Internal Marks.

5.3   There shall be two seminar presentations during III semester and IV semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

5.4   A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

5.5   In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.4) he has to reappear for the End semester Examination in that subject. A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and has failed in the end examination. In such a case, the candidate must re-register for the subject(s) and secure the required minimum attendance. The candidate's attendance in the re-registered subject(s) shall be calculated separately to decide upon his eligibility for writing the end examination in those subject(s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt stand cancelled. For re-registration the candidates have to apply to the University through the college by paying the requisite fees and get approval from the University before the start of the semester in which re-registration is required.

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5.6   In case the candidate secures less than the required attendance in any re registered subject (s), he shall not be permitted to write the End Examination in that subject. He shall again re-register the subject when next offered.

5.7   Laboratory examination for M. Tech. courses must be conducted with two Examiners, one of them being the Laboratory Class Teacher or teacher of the respective college and the second examiner shall be appointed by the university from the panel of examiners submitted by the respective college.

6.0 EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

6.1   A Project Review Committee (PRC) shall be constituted with Head of the Department and two other senior faculty members.

6.2   Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.

6.3   After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

6.4   If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the Project Review Committee (PRC). However, the Project Review Committee (PRC) shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

6.5   A candidate shall submit his status report in two stages at least with a gap of 3 months between them.

6.6   The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after

successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. The candidate has to pass all the theory and practical subjects before submission of the Thesis.

6.7   Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/School/Institute.

6.8   The thesis shall be adjudicated by one examiner selected by the University. For this, the Principal of the College shall submit a panel of 5 examiners, eminent in that field, with the help of the guide concerned and head of the department.

6.9   If the report of the examiner is not favourable, the candidate shall revise and resubmit the Thesis, in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate has to re-register for the project and complete the project within the stipulated time after taking the approval from the University.

6.10   If the report of the examiner is favourable, Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work as one of the following:

A.   Excellent

B.   Good

C.   Satisfactory

D.   Unsatisfactory

The Head of the Department shall coordinate and make arrangements for the conduct of Viva-Voce examination.

6.11   If the report of the Viva-Voce 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 after taking the approval from the University.

7.0 AWARD OF DEGREE AND 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 four classes:

Class Awarded	% of marks to be secured
First Class with Distinction	70% and above (Without any Supplementary Appearance)
First Class	Below 70% but not less than 60% 70% and above (With any Supplementary Appearance)
Second Class	Below 60% but not less than 50%

The marks in internal evaluation and end examination shall be shown separately in the memorandum of marks.

8.0 WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

4.0   TRANSITORY REGULATIONS (for R09)

9.1   Discontinued or detained candidates are eligible for re-admission into same or equivalent subjects at a time as and when offered.

9.2   The candidate who fails in any subject will be given two chances to pass the same subject; otherwise, he has to identify an equivalent subject as per R13 academic regulations.

10. GENERAL

10.1 Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

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

10.3 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

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

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	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

	(theory or practical) in which the candidate is appearing.	work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
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 practicals 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 class work and all University 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	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

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	the examination.	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 class work and all University 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 signs or by visible representation, assaults the officer-in-charge, or any person on duty in or	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.

	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 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 class work and all University 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

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		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 special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/ year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

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Malpractices identified by squad or special invigilators

1.   Punishments to the candidates as per the above guidelines.

2.   Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)

    (i)   A show cause notice shall be issued to the college.

    (ii)   Impose a suitable fine on the college.

    (iii)   Shifting the examination centre from the college to another college for a specific period of not less than one year.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA-533003, Andhra Pradesh (India)
For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

⇨ Ragging within or outside any educational institution is prohibited.

⇨ Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	5 Years	+	Rs.10,000/-
Causing death or abetting suicide	10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE JNTUKA RAGGING FREE UNIVERSITY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA-533003, Andhra Pradesh (India)
For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

ABSOLUTELY
NO TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.

2. Ragging entails heavy fines and/or imprisonment.

3. Ragging invokes suspension and dismissal from the College.

4. Outsiders are prohibited from entering the College and Hostel without permission.

5. Girl students must be in their hostel rooms by 7.00 p.m.

6. All the students must carry their Identity Card and show them when demanded

7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

Jawaharlal Nehru Technological University Kakinada
For Constituent Colleges and Affiliated Colleges of JNTUK

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING
Specialization: COMPUTER SCIENCE & TECHNOLOGY
COURSE STRUCTURE

I SEMESTER

S.NO	SUBJECT	L	P	C
1	ADVANCED DATA STRUCTURES	4	-	3
2	ADVANCED GRAPH THEORY	4	-	3
3	PARALLEL ALGORITHMS	4	-	3
4	DATA MINING AND KNOWLEDGE DISCOVERY	4	-	3
5	ADVANCED COMPUTER NETWORKS	4	-	3
6	DISTRIBUTED PROGRAMMING APPLICATIONS THROUGH JAVA	4	-	3
7	CST LAB I	-	3	2
	TOTAL			**20**

II SEMESTER

S.NO.	SUBJECT	L	P	C
1	ADVANCED COMPUTER ALGORITHMS	4	-	3
2	COMPUTER SYSTEM ENGINEERING	4	-	3
3	ADVANCED UNIX PROGRAMMING	4	-	3
4	**Elective I** MIDDLEWARE TECHNOLOGIES HEALTH INFORMATICS SOFT COMPUTING	4	-	3
5	**Elective II** INFORMATION SECURITY INFORMATION RETRIEVAL SYSTEMS VOIP	4	-	3
6	**Elective III** PATTERN RECOGNITION AND IMAGE PROCESSING MACHINE LEARNING CLOUD COMPUTING	4	-	3
7	CST LAB 2		3	2
	TOTAL			20

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III SEMESTER

S.No.	Subject	L	P	C
1	COMPREHENSIVE VIVA	—	—	2
2	SEMINAR-I	—	—	2
3	PROJECT WORK PART - I	—	—	16
	TOTAL			**20**

IV SEMESTER

S.No.	Subject	L	P	C
1	SEMINAR-II	—	—	2
2	PROJECT WORK PART - II	—	—	18
	TOTAL			**20**

SYLLABUS

I – I	L	P	Credits
	4	-	3
ADVANCED DATA STRUCTURES			

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, Cenage.

3.   C and DataStructures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad, S Chand & Co, 2009.

4.   Data Structures, Algorithm and OOP,Heilman, TMH.

5.   Inroductions to Algorithms, 2/e, Cormen, PHI,2001.

6.   Fundamentals of Computer Algorithms, 2/e, Horowitz, Sahni, Rajasekaran, University Press.

7.   Design and Analysis, Dave, Pearson, 2008.

8.   Design and Analysis Algorithms, Panneerselvam, PHI,2007.

9.   Data Structures, Seymour Lipschutz, Schaum's Outlines, TMH.

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I – I	L	P	Credits
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ADVANCED GRAPH THEORY			

UNIT-I

Basic Concepts: Graphs and digraphs, incidence and adjacency matrices, isomorphism, the automorphism group;

Trees: Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem, minimum spanning trees;

UNIT-II

Connectivity: Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Menger's theorem;

Paths and Cycles: Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, girth, circumference, the Chinese Postman Problem, the Traveling Salesman problem, diameter and maximum degree, shortest paths;

UNIT-III

Matchings: Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartitie and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f-factor theorem;

Extremal problems: Independent sets and covering numbers, Turan's theorem, Ramsey theorems;

UNIT-IV

Colorings: Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem;

Graphs on surfaces: Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces;

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UNIT-IV

Directed graphs: Tournaments, directed paths and cycles, connectivity and strongly connected digraphs, branchings;

Networks and flows: Flow cuts, max flow min cut theorem, perfect square;

Selected topics: Dominating sets, the reconstruction problem, intersection graphs, perfect graphs, random graphs.

TEXT BOOKS:

1. Douglas B. West, Introduction to Graph Theory, Prentice Hall of India.

2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science. Prentice-Hall.

3. Frank Harary, Graph Theory, Narosa.

4. R. Ahuja, T. Magnanti, and J. Orlin, Network Flows: Theory, Algorithms, and Applications, Prentice-Hall.

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I – I	L	P	Credits
	4	-	3
PARALLEL ALGORITHMS			

UNIT1

Introduction :

Computational demand in various application areas, advent of parallel processing,terminology-pipelining,Data parallelism and control parallelism-Amdahl's law. Basic parallel random access Machine Algorithms-definitions of P, NP and NP-Hard, NP-complete classes of sequential algorithms-NC –class for parallel algorithms.

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 minimum 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 theory and practice, Michel J.Quinn

2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

REFERENCE BOOKS:

1. Algorithms for Parallel processing, Michael T Heath, Abhiram Ranade, Schreiber(Ed), Springer.

2. Handbook of Parallel Computing Models, algorithms and applications, Samgithevar Rajasekharan, John Reif(Ed), Taylor and Franics group.

3. Parallel Processing and Parallel Algorithms: Theory and Computation, Seyed H. Roosta, Springer

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I – I	L	P	Credits
	4	-	3
DATA MINING AND KNOWLEDGE DISCOVERY			

UNIT-I

Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data analysis.

UNIT-II

Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier.Nearest Neighborhood classifier, Bayesian Classfier, Support vector Machines: Linear SVM, Separable and Non Separable case.

UNIT-III

Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical , Continuous attributes, Concept hierarchy, Sequential , Sub graph patterns

UNIT-IV

Clustering: Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, Cluster evaluation: overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

UNIT-V

Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines :Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

TEXT BOOKS:

1.   Introduction to Data Mining: Pang-Ning tan, Michael Steinbach, Vipin kumar, Addision- Wesley.

2.   Introduction to Data Mining with Case Studies: GK Gupta; Prentice Hall.

REFERENCE BOOKS:

1.   Data Mining: Introductory and Advanced Topics, Margaret H Dunham, Pearson, 2008.

2.   Fundamentals of data warehouses, 2/e , Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.

3.   Data Mining Theory and Practice, Soman, Diwakar, Ajay, PHI, 2006.

4.   Data Mining , Concepts and Techniques, 2/e, Jiawei Han, Micheline Kamber, Elsevier, 2006.

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I – I		L	P	Credits
		4	-	3
ADVANCED COMPUTER NETWORKS				

UNIT-I

Network layer: Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets.

Routing Algorithm –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks- **congestion control algorithms**-Load shedding, Congestion control in Data gram Subnet.

UNIT-II

IPV4 Address address space, notations, classful addressing, classless addressing network addressing translation(NAT) , **IPV6 Address** structure address space, **Internetworking** need for network layer internet as a data gram, internet as connection less network.

IPV4 datagram, Fragmentation, checksum, options. **IPV6** Advantages, packet format, extension Headers, Transition form IPV4 to IPV6

UNIT–III

Process to process delivery: client/server paradigm, multiplexing and demultiplexing, connectionless versus connection oriented services, reliable versus reliable.

UDP: well known ports for UDP, user data gram, check sum, UDP operation, and uses of UDP

TCP: TCP services, TCP features, segement, A TCP connection, Flow control, error control, congestion control.

SCTP: SCTP services SCTP features, packet format, An SCTP association, flow control, error control.

Congestion control: open loop congestion control, closed loop congestion control, Congestion control in TCP, framework. **QUALITY OF SERVICE**: flow characteristics, flow classes **TECHNIQUES TO**

IMPROVE QOS: scheduling, traffic shaping, resource reservation, admission control.

UNIT –IV

Domain name system: The name space, resource records, name servers

E-mail: architecture and services, the user agent, message formats, message transfer, final delivery

www: architecture overview, static web documents, dynamic web documents, Hyper text transfer protocol, performance elements, the wireless web.

Multimedia: introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the MBone-the multicast back bone

UNIT –V

Emerging trends Computer Networks:

Mobile Adhoc networks :applications of Adhoc networks, challenges and issues in MANETS,MAC layers issues, routing protocols in MANET, transport layer issues, Adhoc networks security.

Wireless sensors networks: WSN functioning, operation system support in sensor devices, WSN Characteristics, sensor network operation, sensor Architecture: cluster management;

Wireless mesh networks WMN design, Issues in WMNs;

TEXT BOOKS:

1. Data communications and networking 4th edtion Behrouz A Fourzan, TMH

2. Computer networks   4th editon Andrew S Tanenbaum, Pearson

3. Computer networks, Mayank Dave, CENGAGE

REFERENCE BOOKS:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New_index1.html

2. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New_index1.html

3. Computer networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

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I – I	L	P	Credits
	4	-	3
DISTRIBUTED PROGRAMMING APPLICATIONS THROUGH JAVA			

UNIT-I

Introduction to distributed programming: Anatomy of a distributed Application, Requirements for Developing Sistributed Applications, What does Java Provide?

Introduction to sockets programming: Sockets and Streams, URLs, URL Connections and ContentHandlers, The ClassLoader.

UNIT-II

Distributing Objects: Why Distribute Objects?, What's so Tough About Distributing Objects?, Features of Distributed Object Systems, Distributed Object Schemes for JAVA, CORBA, Java RMI, RMI Vs CORBA.

Threads: Thread and Runnable, Making a Thread, Managing Threads at Runtime, Networked Threads.

UNIT-III

Security: Security Issues and Concerns, The java. Security Package, Identities and Access Control, Keys: Public, Private and Secret, Digital Signature, Data Encryption, Choosing a Cryptographic Algorithm

Message-Passing Systems: Messages defined, Why Do we need Messages?, Message Processing, Fixed Protocols, Adaptable Protocols, Message Passing with Java Events, Using Remote Objects

Databases: An Overview of JDBC, Remote Database Applications, Multi-Database Applications

UNIT-IV

RMI: The Basic Structure of RMI, The Architecture Diagram Revisited, Implementing the Basic Objects, The Rest of the Server, The Client Application.

The RMI Registry: Why use a Naming Service? The RMI Registry, The

RMI Registry is an RMI Server, Examining the Registry, Limitations of the RMI Registry, Security Issues

UNIT-V

Naming Services: Basic Design, Terminology and Requirements, Requirements for our Naming Service, Federation and Threading, The Context Interface, The Value Objects, ContextImpl, Switching between Naming Services, The Java Naming and Directory Interface(JNDI).

The RMI Runtime: Reviewing the Mechanics of a Remote Method call, Distributed Garbage Collection, RMIs Logging Facilities, Other JVM Parameters.

TEXTBOOKS:

1. Java Distributed Computing , Jim Farley , O' Reilly

2. Java RMI Designing and Building: The Basics of RMI Applications, by William Grosso, O'Reilly

3. Java SOA Cookbookk SOA Implementation Recipes, Tips and Techniques, Eben Hewitt, O'Reilly, 2009

4. Service Oriented Architecture with Java, Malhar Baral, Vincenzo Caselli, Binildas A. Christudas, Packt

REFERENCES:

1. Distributed Programming with Java, Qusay H.Mahnoud, Manning Publisher 2000

2. Java in Distributed Systems: Concurrency , Distribution and Persistence, Marko Boger, 2001.

3. Developing Distributed and E-Commerce Applications, Darrel Ince, 2/e , Addison Wesly, 2004.

4. Java Message Service(O'Reilly Java Series), Richard Monson- Haefel, David Chappell.

5. Sun SL 301 Distributed Programming with Java.

6. Java Tutorial, http://java.sun.com/docs/books/tutorial/index.html.

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I – I		L	P	Credits
		-	4	2
CST LAB1				

Covering Experiments from ADS, DMKD, CN and Distributed Java Programming

I – II	L	P	Credits
	4	-	3
ADVANCED COMPUTER ALGORITHMS			

UNIT-I

Design Paradigms: Overview : Overview of Divide and Conquer, Greedy and Dynamic Programming strategies. Basic search and traversal techniques for graphs, Backtracking, Branch and Bound,Max Flow Problem

UNIT-II

String Matching: Introduction to string-matching problem, Naïve algorithm, Rabin Karp, Knuth Morris Pratt, Boyer-Moore algorithms and complexity analysis.

Theory of NP- Hard and NP-Complete Problems. : P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; Other complexity classes.

UNIT-III

Approximation Algorithms : Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

UNIT-IV

Parallel Algorithms : Introduction, Models, speedup and efficiency, Some basic techniques, Examples from graph theory, sorting, Parallel sorting networks. Parallel algorithms and their parallel time and processors complexity.

UNIT-V

Probabilistic Algorithms & Randomized Algorithms : Numerical probabilistic algorithms, Las Vegas and Monte Carlo algorithms, Game-theoretic techniques, Applications on graph problems

TEXT BOOKS :

1. Introduction to Algorithms : T.H. Cormen, C.E.Leiserson and R.L. Rivest

2. Fundamentals of Algorithmics : G.Brassard and P.Bratley

3. Approximation Algorithms: Vijay V.Vazirani

4. Randomized Algorithms: R. Motwani and P.Raghavan

5. Reference book: Algorithmics :The spirit of computing: D.Harel

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I – II	L	P	Credits
	4	-	3
COMPUTER SYSTEM ENGINEERING			

UNIT-I

Evolution of Computer Architecture, System Attributes to performance; Shared Memory Multiprocessors, Distributed Memory Multiprocessors, A Taxonomy of MIMD Computers; architecture of Vector Super computers, operational model of SIMD computer, PRAM models and PRAM variants

Conditions of Parallelism - data and resource dependencies, hardware and software parallelism, Program partitioning and Scheduling- grain sizes and latency, grain packing and scheduling, static multi processor scheduling, Program flow mechanisms- control flow vs data flow, demand driven mechanisms, comparison of flow mechanisms, System interconnect architectures- network properties and routing, static and dynamic connection networks.

UNIT-II

Principles of scalable performances- performance metrics and measures- parallelism profile in programs, mean performance, efficiency, utilization and quality, benchmarks and performance measures, characteristics of parallel processing applications, Speed up performance laws- Amdahl's law, Gustafson's law, memory bounded speed up model, Scalability metrics and goals, Bus systems- back plane bus specification, Addressing and Timing protocols, Arbitration, transaction and interrupt, IEEE future bus standard requirement set, Shared memory organizations- Interleaved memory organization, band width and fault tolerance, memory allocation schemes, Atomicity and event ordering

UNIT-III

Linear Pipeline Processors- asynchronous and synchronous models, clocking and timing control, speedup, efficiency, and throughput, Non linear pipeline processors- reservation and latency analysis, collision free scheduling, pipeline schedule optimization, Instruction Pipeline design- instruction execution phases, mechanisms for instruction

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pipelining, dynamic instruction scheduling, branch handling techniques, static arithmetic pipelines.

Hierarchical bus system, cross bar switch and multiport memory, multistage and combining networks, multistage and combining networks, The cache coherence problem, message passing mechanism-message routing schemes, deadlock virtual channels, flow control strategies, multicast routing algorithms

UNIT-IV

Vector processing principles- vector instruction types, vector access memory schemes, early super computers, Multi vector multiprocessors-performance directed design rules, architecture of Cray and MPP, Compound vector operations, vector loops and chaining, SIMD computer organizations

UNIT-V

Latency-hiding techniques- shared virtual memory, prefetching techniques, distributed coherent caches, scalable coherence interface, relaxed memory consistency, principles of multithreading and context switching policies, MPD architecture, The Tera multiprocessor system, Data flow computer architecture

TEXT BOOKS:

1. KAI HWANG & NARESH JOTWANI, "Advanced Computer Architecture- Parallelism, Scalability, Programmability" Second Edition, Mc Graw Hill Publishing.

REFERENCE BOOKS:

1. HENNESSY PATTERSON, "Computer Architecture- A Quantitative Approach" Fifth Edition, Elsevier

2. KAI HWANG, "Advanced Computer Architecture- Parallelism, Scalability, Programmability", TMH.

3. Computer Architecture, Concepts and Evolutions, Garrit A Blaauw, PEA

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I – II	L	P	Credits
	4	-	3
ADVANCED UNIX PROGRAMMING			

UNIT-I

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II

TCP client server : Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

UNIT-III

Sockets : Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

UNIT-IV

Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

UNIT-V

IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores.

Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

TEXT BOOK:

1. UNIX Network Programming,Vol.I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson   Edn. Asia.

2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

REFERENCES:

1. UNIX Systems Programming using C++ T CHAN, PHI.

2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education

3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

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I – II	L	P	Credits
	4	-	3
MIDDLEWARE TECHNOLOGIES			

UNIT-I

Introduction to Object Oriented Systems :

Preview of Object-orientation, Concept of distributed object systems, Reasons to distribute for centralized Objects. Client-server system architecture, Multitier system architectures. File Server, Database Server, Group Server, Object Server, Web Server.

UNIT-II

Introduction to Middleware Technologies:

General Middleware, Service Specific Middleware, Client/Server Building blocks, RPC- messaging, Peer to Peer, Java RMI.

Introduction to Distributed Objects :

Computing standards, OMG, Overview of CORBA, Overview of COM/ DCOM, and Overview of EJB.

UNIT-III

EJB Architecture :

Overview of EJB software architecture, View of EJB Conversation, Building and Deploying EJBs, Roles in EJB.

UNIT-IV

CORBA

Introduction and concepts, distributed objects in CORBA, CORBA components, architectural features, method invocations, static and dynamic: IDL (Interface Definition Language) models and interfaces. Structure of CORBA IDL, CORBA's self-describing data; CORBA interface repository. Building an application using CORBA.

CORBA Services and CORBA Component Model :

Overview of CORBA Services, Object location Services, Messaging Services, CORBA Component Model.

UNIT-V

COM and NET

Evolution of DCOM, Introduction to COM, COM clients and servers, COM IDL, COM Interfaces, COM Threading Models, Marshalling, Custom and standard marshalling, Comparison COM and CORBA, Introduction to .NET, Overview of .NET architecture, Remoting.

Service Oriented architecture (SOA) Fundamentals:

Defining SOA, Business value of SOA, SOA characteristics, Concept of a service, Basic SOA, Enterprise Service Bus (ESB), SOA enterprise Software Models.

TEXT BOOKS:

1. Distributed Component Architecture, G. Sudha Sadasivam , Wiley

2. Service Oriented Architecture: Concepts , Technology & Design, Thomas Erl, PHI

3. Java programming with CORBA, 3/e, G. Brose, A Vogel, K. Duddy, Wiley-dreamtech

4. Distributed Systems, 2/e, Tanenbaum, Van Steen, PEA

REFERENCE BOOKS :

1. Client/server Programming with Java & Corba W/cd, Robert Orfali, Dan Harkey, Wile

2. Component Software: Beyond Object-Oriented Programming, Clemens Szyperski, PEA.

3. Inside CORBA, Mowbray, PEA

4. COM and CORBA side by side, Jason Pritchard, PEA

5. Enterprise JavaBeans 3.0, 5/e, Bill Burke, O'Reilly

6. Component Based technology, Sudha Sadasivam, Wiley

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HEALTH INFORMATICS			

UNIT-I

Medical Informatics: The Health Information Technology Decade:
Introduction, Medical Informatics, The Health Information Technology
Decade, Health Insurance Portability and Accountability Act (HIPAA)
of 1996: A Brief Introduction, The Patient Information Form, The Paper
Medical Record, The Electronic Medical Record (EMR), The Electronic
Health Record (HER), Regional Health Information Organizations
(RHIOs), The Indian Health Service Electronic Health Record, Computer
Information Systems in Health Care, Does Computerization Improve
Patient Outcomes?

UNIT-II

Information Technology in Public Health: Introduction, Definition,
Social Inequality, Poverty, and Health, Using Computers to Study
Disease, Statistics and Epidemics: A Historical Overview, The
Emergence of New Infectious Diseases: AIDS, SARS, Bird Flu, West
Nile Virus, Mad Cow, Computer Modeling of Disease: Health Statistics
and Infectious Disease, MIDAS (Models of Infectious Disease Agent
Study), Climate Change: Global Warming, The Public Health Response
to Hurricane Katrina

UNIT-III

Information Technology in Radiology: Introduction, X-rays,
Ultrasound, Digital Imaging Techniques, Computerized Tomography,
Magnetic Resonance Imaging, Positron Emission Tomography, SPECT
Scanning, Other Imaging Systems, Bone Density Tests, PACS,
Interventional Radiology: Bloodless Surgery

Information Technology in Surgery — The Cutting Edge: Overview,
Computer-Assisted Surgery, Computer-Assisted Surgical Planning,
Robots, Minimally Invasive Surgery, Endoscopic Surgery and
Augmented Reality, ROBODOC, AESOP, ZEUS, MINERVA, and other

robotic devices, Augmented Reality, Telepresence Surgery, NEEMO, The Operating Room of the Future

UNIT-IV

Information Technology Pharmacy: Overview, The Food and Drug Administration (FDA). Uncertified Medicines, Biotechnology and The Human Genome Project, Rational Drug Design, Bioinformatics, The Human Genome Project, Developments in Biotechnology, Computer Assisted Drug Trials, Computer Assisted Drug Review, The Computerized Pharmacy, Computers and Drug Errors, he Automated Community Pharmacy, Automating the Hospital Pharmacy, The Hospital Pharmacy Robot and Bar Codes, Point-of-Use Drug Dispensing, Computerized IVs and Bar-codes, Radio Frequency Identification (RFID) tags, Telepharmacy, Drug Delivery on a Chip, The Impact of Information Technology on Pharmacy

UNIT-V

Information Technology in Dentistry: Overview, Education, Administrative Applications, The Electronic Dental Chart, Demographics And The Transformation Of Dentistry, Computerized Instruments in Dentistry, Endodontics , Periodontics, Cosmetic Dentistry, Diagnosis and Expert Systems, Diagnostic Tools, X-rays, Digital Radiography, Electrical Conductance, Emerging Methods, Light Illumination, Lasers in Dentistry , Minimally Invasive Dentistry, Surgery, The Growth of Specialization, Teledentistry

TEXT BOOK:

1. Information Technology for the Health Professions, 3/E, Lillian Burke, Barbara Weill, *PHI*

I – II	L	P	Credits
	4	-	3
SOFT COMPUTING			

UNIT-I

FUZZY SET THEORY: Introduction to Neuro – Fuzzy and Soft Computing, Fuzzy Sets, Basic Definition and Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations, Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.

UNIT-II

OPTIMIZATION: Derivative based Optimization, Descent Methods, The Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Genetic Algorithms, Simulated Annealing, Random Search – Downhill Simplex Search.

UNIT-III

ARTIFICIAL INTELLIGENCE : Introduction, Knowledge Representation, Reasoning, Issues and Acquisition: Prepositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainity Basic knowledge Representation Issues Knowledge acquisition,

Heuristic Search: Techniques for Heuristic search Heuristic Classification

State Space Search: Strategies Implementation of Graph Search Search based on Recursion Patent-directed Search Production System and Learning.

UNIT-IV

NEURO FUZZY MODELING: Adaptive Neuro-Fuzzy Inference Systems, Architecture – Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

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UNIT-V

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE : Printed Character Recognition, Inverse Kinematics Problems, Automobile Fuel Efficiency Prediction, Soft Computing for Color Recipe Prediction.

TEXT BOOKS:

1.   J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

2.   N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press, 2006.

REFERENCES:

1.   Elaine Rich & Kevin Knight, Artificial Intelligence, Second Edition, Tata Mcgraw Hill Publishing Comp., 2006, New Delhi.

2.   Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.

3.   Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.

4.   S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 200UNIT III

5.   R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools",   AP Professional, Boston, 1996.

6.   Amit Konar, "Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain", CRC Press, 2008

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I – II	L	P	Credits
	4	-	3
INFORMATION 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

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

Web 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

SNMP: Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats

Fire walls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems

TEXT BOOKS:

1. Network Security Essentials: Applications and Standards, William Stallings, PEA.

2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

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

2. Fundamentals of Network Security, Eric Maiwald, Dream Tech

3. Network Security: Private Communication in a Public World, Kaufman, Perlman, PEA/PHI.

4. Principles of Information Security, Whitman, Thomson.

5. Cryptography and Network Security, 3/e, Stallings, PHI/PEA

6. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH

7. Introduction to Cryptography, Buchmann, Springer

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I – II	L	P	Credits
	4	-	3
INFORMATIONAL RETRIEVAL SYSTEMS			

UNIT-I

Introduction to Information storage and retrieval systems:

Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation

Introduction to Data structures and algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

UNIT-II

Inverted Files and Signature Files:

Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques.

Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT-III

New Indices for Text, Lexical Analysis and Stoplists:

PAT Trees and PAT Arrays: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Lexical Analysis, Stoplists.

UNIT-IV

Stemming Algorithms and Thesaurus Construction:

Types of Stemming algorithms, Experimental Evaluations of Stemming, Stemming to Compress Inverted Files.

Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

UNIT-V

String Searching Algorithms:

Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-

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Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

TEXT BOOKS

1. Modern Information Retrieval, Ricardo Baeza-Yates, Neto, PEA,2007.

2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.

3. Information Retrieval: Algorithms and Heuristics , Grossman, Ophir Frieder, 2/e, Springer, 2004.

REFERENCE BOOKS

1. Information Retrieval Data Structures and Algorithms , Frakes, Ricardo Baeza-Yates, PEA

2. Information Storage and Retieval, Robert Korfhage, John Wiley & Sons.

3. Introduction to Information Retrieval, Manning, Raghavan, Cambridge University Press.

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I – II	L	P	Credits
	4	-	3
VOIP			

UNIT-I

Overview of the PSTN and comparisons to Voice over IP : The Beginning of the PSTN, Understanding PSTN Basics , PSTN Services and Applications, Drivers Behind the Convergence Between Voice and Data Networking, Packet Telephony Network Drivers, New PSTN Network Infrastructure Model

Enterprise telephony today : Similarities Between PSTN and ET, Differences Between PSTN and ET, Common ET and PSTN Interworking, ET Networks Provided by PSTN

UNIT-II

Basic telephony signaling: Signaling Overview, E&M Signaling, CAS, ISDN , QSIG , QSIG Services , QSIG Architecture and Reference Points, QSIG Protocol Stack, QSIG Basic Call Setup and Teardown Example, DPNSS

Signaling system 7 : SS7 Network Architecture, SS7 Protocol Overview

UNIT-III

PSTN services : Plain Old Telephone Service, Business Services, Service Provider Services

IP Tutorial : OSI Reference Model, Internet Protocol, Data Link Layer Addresses, IP Addressing , Routing Protocols, EIGRP, IP Transport Mechanisms

VoIP: an in-depth analysis : Delay/Latency, Jitter, Pulse Code Modulation, Voice Compression, Echo, Packet Loss , Voice Activity Detection, Digital-to-Analog Conversion, Tandem Encoding, Transport Protocols , Dial-Plan Design, End Office Switch Call-Flow Versus IP Phone Call

UNIT-IV

Quality of service : QoS Network Toolkit, Edge Functions, Traffic Policing, Backbone Networks, Rules of Thumb for QoS, Cisco Labs'

QoS Testing

Billing and mediation services: Billing Basics, Case Study: Cisco SIP Proxy Server and Billing, Challenges for VoIP Networks, Mediation Services

Voice security : Security Requirements , Security Technologies, Protecting Voice Devices , Protecting IP Network Infrastructure, Security Planning and Policies

UNIT-V

H.323 : H.323 Elements, H.323 Protocol Suite , H.323 Call-Flows

SIP : SIP Overview, SIP Message Building Blocks , Basic Operation of SIP, SIP Procedures for Registration and Routing, SIP Extensions

Gateway control protocols : MGCP Overview , MGCP Model , MGCP Commands and Messages , MGCP Call Flows , Advanced MGCP Features, H.248/MEGACO

PSTN and VoIP internetworking : Cisco Packet Telephony, Packet Voice Network Overview , Residential Gateway , Network Interfaces , PGW2200 Architecture and Operations, PGW2200 Implementation, PSTN Signaling Over IP , Changing Landscape of PSTN-IP Interworking, Session Border Controller (SBC)

TEXT BOOKS:

1. Voice over IP Fundamentals: Second Edition, Jonathan Davidson, James Peters, Cisco Press , 2009

REFERENCES:

1. Davidson, Jonathan, James Peters, Manoj Bhatia, Satish Kalidini, and Sudipto Mukherjee. Voice over IP Fundamentals: Second Edition. 2nd ed. San Jose, CA: Cisco Press, Aug. 2008. ISBN: 9781587053176

2. Siddiqui, Kashif, Faisal Chaudry, and Kashif Zeeshan. Voip Architectures for Large-scale Networks. San Jose, CA: Cisco Systems, Nov. 2007. ISBN: 9781587052491

3. Geier, Jim. Deploying Voice over Wireless LANs. Ed. Jim Geier. Upper Saddle River, NJ: Pearson Education, 14 Mar. 2007. ISBN: 9781587052316

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I – II	L	P	Credits
	4	-	3
PATTERN RECOGNITION AND IMAGE PROCESSING			

UNIT-I

Pattern Recognition: machine perception,pattern recognition example, pattern recognition systems,the design cycle,learning and adaptation. Bayesian Decision Theory: Introduction,continuous features-two categories classifications,minimum error rate classification-zero-one loss function,classifiers ,discriminant functions,and decision surfaces.

Normal density: Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context.

UNIT-II

Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures,   K-means clustering. Date description and clustering – similarity measures, criteria function for clustering **Component analyses:** Principal component analysis,non-linear component analysis,Low dimensional representations,and multi dimensional scaling.

UNIT-III

Digitized Image and its properties: Basic concepts, Image Functions, the dirac distribution and convolution, the Fourier transform, Images as a Stochastic process, Images as linear systems. **Image Digitization:** Sampling, Quantization, Colour Images. **Digital Image Properties**: Metric and topological properties of Digital Images, Histograms, Visual perception of the Image, Image quality, Noise in Images.**Data Structures for Image Analysis:** Levels of Image Data representation, traditional Image Data Structures- Matrices, Chains, Topological Data Structures, Relational Structures.

UNIT-IV

Image Pre-processing: Pixel brightness transformation. Position dependent brightness correction, Gray scale transformation. Geometric

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Transformations — Pixel co-ordinate transformation, Brightness interpolation. Local Pre-processing – Image smoothing, Edge-detectors, Zero crossings of the second deritives, scale in Image processing, canny edge detection, parametric edge models, edges in multi spectral images, other local pre-processing operators, adaptive neighborhood pre-processing.

UNIT-V

Segmentation: Thresholding – Threshold detection methods, optimal thresholding, multi- spectral thresholding, thresholding in hierarchical data structures. **Edge Based Segmentation:** Edge image thresholding, Edge relaxation, border tracing, border detection as graph searching, border detection as dynamic programming, Hough transformation, border detection using border location information, region construction from borders. **Region Based Segmentation:** Region merging, region splitting, splitting and merging, Watershed segmentation, region growing post processing.

TEXT BOOKS:

1. Image Processing, Analysis and Machine Vision – Milan Sonka, Vaclav Hlavac, Roger Boyle, Second Edition – Vikas Publishing House.

2. Pattern classification ,Richard o.Duda,peter E.Hart,David G.Stroke, Wiley student edition,2nd edition.

3. Digital Image processing , Rafeal C.Gonzalez,Richard E.Woods, 2nd edition,Pearson Education/PHI.

REFERENCE:

1. Digital Image Processing And Analysis – Chanda & Majumder

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I – II	L	P	Credits
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MACHINE LEARNING			

UNIT-I

Introduction :

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning

concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT-II

Decision Tree learning:

Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Issues in decision tree learning

UNIT-III

Artificial Neural Networks:

Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks

Evaluation Hypotheses : Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT-IV

Bayesian learning:

Introduction, Bayes theorem, Bayes theorem and concept learning,

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Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

UNIT-V

Computational learning theory :

Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces - Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

Genetic Algorithms :

Motivation, Genetic Algorithms, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

TEXT BOOKS:

1.   Machine Learning ,Tom M. Mitchell, MGH

2.   Machine Learning, An Algorithmic Perspective, Stephen Marsland, Taylor & Francis(CRC)

REFERENCE BOOKS:

1.   Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004

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	4	-	3
CLOUD COMPUTING			

UNIT–I

Introduction to virtualization and virtual machine, Virtualization in Cluster /grid context Virtual network, Information model & data model for virtual machine, Software as a Service (SaaS), SOA, On Demand Computing.

UNIT–II

Cloud computing: Introduction, What it is and What it isn't, from Collaborations to Cloud, Cloud application architectures, Value of cloud computing, Cloud Infrastructure models, Scaling a Cloud Infrastructure, Capacity Planning, Cloud Scale.

UNIT–III

Data Center to Cloud: Move into the Cloud, Know Your Software Licenses, The Shift to a Cloud Cost Model, Service Levels for Cloud Applications

UNIT–IV

Defining Clouds for the Enterprise- Storage-as-a-Service, Database-as-a-Service, Information-as-a-Service, Process-as-a-Service, Application-as-a-Service, Platform-as-a-Service, Integration-as-a-Service, Security-as-a-Service, Management/Governance-as-a-Service, Testing-as-a-Service Infrastructure-as-a-Service

UNIT–V

Security: Disaster Recovery, Web Application Design, Machine Image Design, Privacy Design, Database Management, Data Security, Network Security, Host Security, Compromise Response

Disaster Recovery, Disaster Recovery, Planning, Cloud Disaster Management

Case study: Types of Clouds, Cloudcentres in detail, Comparing

approaches, Xen   OpenNEbula , Eucalyptus, Amazon, Nimbus

TEXT BOOKS:

1. Cloud Computing – Web Based Applications That Change the way you Work and Collaborate Online **– Michael Miller**, Pearson Education.

2. Cloud Application Architectures, 1st Edition by **George Reese** O'Reilly Media.

REFERENCE BOOK:

1. Cloud Computing and SOA Convergence in Your Enterprise:A Step-by-Step Guide **David S.Linthicum** Addison-Wesley Professional

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	-	4	3
CST LAB2			

Covering experiments from core subjects