ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

For
COMPUTER SCIENCE ENGINEERING
BRANCH

COMPUTER SCIENCE & TECHNOLOGY

JAWAHARLAL NEHRU TECHNOLOGY UNIVERSITY KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India
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. M.E- 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  
11. M.Tech- Power Electronics  
12. M.Tech- Power & Industrial Drives  
13. M.Tech- Power Electronics & Electrical Drives  
15. M.Tech- Power Electronics & Drives  
16. M.Tech- Power Systems  
17. M.Tech- Power Systems Engineering  
18. M.Tech- High Voltage Engineering  
20. M.Tech- Power System and Control  
22. M.Tech- Electrical Machines and Drives  
23. M.Tech- Advanced Power Systems  
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  
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  
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
Computer Science & Technology

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
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  
|------------|--------------------------------------------------------------------------------|
| 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  
10. M.Tech- Power System and Control  
11. M.Tech- Power Electronics & Systems  
12. M.Tech- Electrical Machines and Drives  
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  
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  |
<table>
<thead>
<tr>
<th>Computer Science &amp; Technology</th>
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<tbody>
<tr>
<td><strong>ECE</strong></td>
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<tr>
<td>3. M.Tech- Electronics &amp; Communications Engineering</td>
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<tr>
<td>4. M.Tech- Communication Systems</td>
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<tr>
<td>5. M.Tech- Communication Engineering &amp; Signal Processing</td>
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<td>7. M.Tech- Telematics</td>
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<td>9. M.Tech- Embedded System</td>
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<td>10. M.Tech- VLSI</td>
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<td>11. M.Tech- VLSI Design</td>
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<td>12. M.Tech- VLSI System Design</td>
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<td>14. M.Tech- VLSI &amp; Embedded System</td>
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<tr>
<td>15. M.Tech- VLSI Design &amp; Embedded Systems</td>
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<td>16. M.Tech- Image Processing</td>
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<td>17. M.Tech- Digital Image Processing</td>
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<td>18. M.Tech- Computers &amp; Communication</td>
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<tr>
<td>20. M.Tech- Instrumentation &amp; Control Systems</td>
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<tr>
<td>23. M.Tech- Embedded System &amp; VLSI</td>
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<tr>
<td><strong>CSE</strong></td>
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<tr>
<td>1. M.Tech- Computer Science &amp; Engineering</td>
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<tr>
<td>2. M.Tech- Computer Science</td>
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<tr>
<td>3. M.Tech- Computer Science &amp; Technology</td>
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<tr>
<td>4. M.Tech- Computer Networks</td>
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<td>5. M.Tech- Computer Networks &amp; Information Security</td>
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<td>7. M.Tech- Software Engineering</td>
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<td>8. M.Tech- Neural Networks</td>
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<tr>
<td><strong>Others</strong></td>
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<td>2. M.Tech- Biotechnology</td>
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<td>3. M.Tech- Nano Technology</td>
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<td>4. M.Tech- Food Processing</td>
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<td>5. M.Tech- Avionics</td>
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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 5 questions to be 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.
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:

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
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<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above (Without any Supplementary Appearance)</td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60% 70% and above (With any Supplementary Appearance)</td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Nature of Malpractices/Improper conduct</th>
<th>Punishment</th>
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<tr>
<td><strong>If the candidate:</strong></td>
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<tr>
<td>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)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>(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.</td>
<td>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.</td>
</tr>
<tr>
<td>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</td>
<td>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</td>
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<td>(theory or practical) in which the candidate is appearing.</td>
<td>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.</td>
</tr>
<tr>
<td>3. Impersonates any other candidate in connection with the examination.</td>
<td>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.</td>
</tr>
<tr>
<td>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</td>
<td>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</td>
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</table>
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.
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<td></td>
<td>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.</td>
</tr>
<tr>
<td>7.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
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<td></td>
<td>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.</td>
</tr>
<tr>
<td>8.</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
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</table>
|   | 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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<tbody>
<tr>
<td>9.</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>10.</td>
<td>Comes in a drunken condition to the examination hall.</td>
<td>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.</td>
</tr>
<tr>
<td>11.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
<td>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.</td>
</tr>
<tr>
<td>12.</td>
<td>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.</td>
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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.
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.

<table>
<thead>
<tr>
<th>Ragging Activity</th>
<th>Imprisonment up to</th>
<th>Fine up to</th>
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<tbody>
<tr>
<td>Teasing, Embarrassing and Humiliation</td>
<td>6 Months</td>
<td>Rs. 1,000/-</td>
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<tr>
<td>Assaulting or Using Criminal force</td>
<td>1 Year</td>
<td>Rs. 2,000/-</td>
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<tr>
<td>or Criminal intimidation</td>
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<td>Wrongfully restraining or confining</td>
<td>2 Years</td>
<td>Rs. 5,000/-</td>
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<td>or causing hurt</td>
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<tr>
<td>Causing grievous hurt, kidnapping</td>
<td>5 Years</td>
<td>Rs. 10,000/-</td>
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<td>or Abducts or rape or committing</td>
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<td>unnatural offence</td>
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<tr>
<td>Causing death or abetting suicide</td>
<td>10 Months</td>
<td>Rs. 50,000/-</td>
</tr>
</tbody>
</table>

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288
LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
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.

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288
LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
<table>
<thead>
<tr>
<th>S.NO</th>
<th>SUBJECT</th>
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<td>2</td>
<td>ADVANCED GRAPH THEORY</td>
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<td>3</td>
<td>PARALLEL ALGORITHMS</td>
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<td>3</td>
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<td>4</td>
<td>DATA MINING AND KNOWLEDGE DISCOVERY</td>
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<td>3</td>
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<td>5</td>
<td>ADVANCED COMPUTER NETWORKS</td>
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<td>3</td>
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<td>6</td>
<td>DISTRIBUTED PROGRAMMING APPLICATIONS</td>
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<td>THROUGH JAVA</td>
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### III SEMESTER

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### IV SEMESTER

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SYLLABUS

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ADVANCED DATA STRUCTURES

UNIT-I

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.

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:

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.
4. Data Structures, Algorithm and OOP, Heilman, TMH.
9. Data Structures, Seymour Lipschutz, Schaum's Outlines, TMH.
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 bipartite 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;
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.

TEXTBOOKS:

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.
UNIT I

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:

UNIT III

Algorithms:
Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models.

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.

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

REFERENCE BOOKS:
1. Algorithms for Parallel processing, Michael T Heath, Abhiram Ranade, Schreiber(Ed), Springer.
2. Handbook of Parallel Computing Models, algorithms and applications, Samgithyvar Rajasekharan, John Reif(Ed), Taylor and Francis group.
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 Classifier, 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: Overview, 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:
2. Fundamentals of data warehouses, 2/e , Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.
4. Data Mining , Concepts and Techniques, 2/e, Jiawei Han, Micheline Kamber, Elsevier, 2006.
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.


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, frame relay, 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 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:
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 edition Behrouz A Fourzan, TMH
3. Computer networks, Mayank Dave, CENGAGE

REFERENCE BOOKS:
UNIT I
Introduction to distributed programming: Anatomy of a distributed Application, Requirements for Developing Distributed 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
Databases: An Overview of JDBC, Remote Database Applications, Multi-Database Applications

UNIT IV
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


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
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, 2004
5. Sun SL 301 Distributed Programming with Java.
CST LAB1

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

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UNIT-I


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**:

3. Approximation Algorithms: Vijay V.Vazirani
4. Randomized Algorithms: R. Motwani and P.Raghavan
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 pipe line design- instruction execution phases, mechanisms for instruction
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:

REFERENCE BOOKS:
2. KAI HWANG, “Advanced Computer Architecture- Parallelism, Scalability, Programmability”, TMH.
3. Computer Architecture, Concepts and Evolutions, Garrit A Blaauw, PEA
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:

REFERENCES:
1. UNIX Systems Programming using C++, T.CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, Kingabls, Pearson Education
UNIT I

Introduction to Object Oriented Systems:

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
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:
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
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


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

UNIT-IV


UNIT-V


**TEXTBOOK:**

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

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SOFT COMPUTING

UNIT-I


UNIT-II


UNIT-III


UNIT-IV

UNIT V


TEXT BOOKS:

REFERENCES:
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


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

REFERENCE BOOKS:
2. Fundamentals of Network Security, Eric Maiwald, Dream Tech
5. Cryptography and Network Security, 3/e, Stallings, PHI/PEA
7. Introduction to Cryptography, Buchmann, Springer
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:

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-

TEXT BOOKS

REFERENCE BOOKS
1. Information Retrieval Data Structures and Algorithms, Frakes, Ricardo Baeza-Yates, PEA
2. Information Storage and Retrieval, Robert Korthage, John Wiley & Sons.
3. Introduction to Information Retrieval, Manning, Raghavan, Cambridge University Press.
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


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


**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:**


**REFERENCES:**


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 Bayes 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


UNIT IV

Image Pre-processing: Pixel brightness transformation – Position dependent brightness correction, Gray scale transformation. Geometric
Transformations — Pixel co-ordinate transformation, Brightness interpolation. Local Pre-processing – Image smoothing, Edge-detectors, Zero crossings of the second derivatives, 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:

REFERENCE:
1. Digital Image Processing And Analysis – Chanda & Majumder
UNIT-I
Introduction:

UNIT-II
Decision Tree learning:

UNIT-III
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.
Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs 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

**REFERENCE BOOKS:**
1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004
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

UNIT-V
Disaster Recovery, Disaster Recovery, Planning, Cloud Disaster Management
Case study: Types of Clouds, Cloudcentres in detail, Comparing
approaches, Xen OpenNEbula, Eucalyptus, Amazon, Nimbus

**TEXTBOOKS:**

**REFERENCE BOOK:**
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**CST LAB2**

Covering experiments from core subjects