ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

For
ECE BRANCH

COMMON FOR
SYSTEMS & SIGNAL PROCESSING (SSP)
DIGITAL IMAGE PROCESSING (DIP)
COMMUNICATION & SIGNAL PROCESSING (C&SP)
COMMUNICATION ENGINEERING & SIGNAL
PROCESSING (CE&SP)
IMAGE PROCESSING(IP)
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
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
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:

<table>
<thead>
<tr>
<th>Civil Engg.</th>
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<tbody>
<tr>
<td>1. M.Tech- Structural Engineering</td>
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<tr>
<td>2. M.Tech- Transportation Engineering</td>
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<tr>
<td>3. M.Tech- Infrastructure Engineering &amp; Management</td>
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<tr>
<td>4. ME- Soil Mechanics and Foundation Engineering</td>
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<td>5. M.Tech- Environmental Engineering</td>
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<td>6. M.Tech-Geo-Informatics</td>
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<td>7. M.Tech-Spatial Information Technology</td>
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<tr>
<td>8. M.Tech- Civil Engineering</td>
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<table>
<thead>
<tr>
<th>EEE</th>
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<tbody>
<tr>
<td>1. M.Tech- Power Electronics</td>
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<tr>
<td>2. M.Tech- Power &amp; Industrial Drives</td>
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<tr>
<td>3. M.Tech- Power Electronics &amp; Electrical Drives</td>
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<tr>
<td>4. M.Tech- Power System Control &amp; Automation</td>
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<td>5. M.Tech- Power Electronics &amp; Drives</td>
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<td>6. M.Tech- Power Systems</td>
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<td>11. M.Tech- Power Electronics &amp; Systems</td>
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<td>12. M.Tech- Electrical Machines and Drives</td>
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<td>15. M.Tech- Control Engineering</td>
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<td>16. M.Tech- Control Systems</td>
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<td>17. M.Tech- Electrical Power Engineering</td>
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<td>18. M.Tech- Power Engineering &amp; Energy System</td>
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<tr>
<th>ME</th>
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<tbody>
<tr>
<td>1. M.Tech- Thermal Engineering</td>
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<tr>
<td>2. M.Tech- CAD/CAM</td>
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<tr>
<td>4. M.Tech- Computer Aided Design and Manufacture</td>
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<tr>
<td>5. M.Tech- Advanced Manufacturing Systems</td>
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<tr>
<td>6. M.Tech-Computer Aided Analysis &amp; Design</td>
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<tr>
<td>7. M.Tech- Mechanical Engineering Design</td>
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<td>ECE</td>
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<tr>
<td>3.</td>
<td>M.Tech- Electronics &amp; Communications Engineering</td>
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<td>4.</td>
<td>M.Tech- Communication Systems</td>
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<td>5.</td>
<td>M.Tech- Communication Engineering &amp; Signal Processing</td>
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<tr>
<td>6.</td>
<td>M.Tech- Microwave and Communication Engineering</td>
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<td>7.</td>
<td>M.Tech- Telematics</td>
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<td>9.</td>
<td>M.Tech- Embedded System</td>
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<td>10.</td>
<td>M.Tech- VLSI</td>
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<td>11.</td>
<td>M.Tech- VLSI Design</td>
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<td>12.</td>
<td>M.Tech- VLSI System Design</td>
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<td>14.</td>
<td>M.Tech- VLSI &amp; Embedded System</td>
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<tr>
<td>15.</td>
<td>M.Tech- VLSI Design &amp; Embedded Systems</td>
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<td>16.</td>
<td>M.Tech- Image Processing</td>
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<td>17.</td>
<td>M.Tech- Digital Image Processing</td>
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<td>18.</td>
<td>M.Tech- Computers &amp; Communication</td>
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<tr>
<td>20.</td>
<td>M.Tech- Instrumentation &amp; Control Systems</td>
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<tr>
<td>23.</td>
<td>M.Tech- Embedded System &amp; VLSI</td>
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<thead>
<tr>
<th>CSE</th>
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<tbody>
<tr>
<td>1.</td>
<td>M.Tech- Computer Science &amp; Engineering</td>
</tr>
<tr>
<td>2.</td>
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<tr>
<td>3.</td>
<td>M.Tech- Computer Science &amp; Technology</td>
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<tr>
<td>4.</td>
<td>M.Tech- Computer Networks</td>
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<tr>
<td>5.</td>
<td>M.Tech- Computer Networks &amp; Information Security</td>
</tr>
<tr>
<td>6.</td>
<td>M.Tech- Information Technology</td>
</tr>
<tr>
<td>7.</td>
<td>M.Tech- Software Engineering</td>
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<td>8.</td>
<td>M.Tech- Neural Networks</td>
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<thead>
<tr>
<th>Others</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>M.Tech- Chemical Engineering</td>
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<tr>
<td>2.</td>
<td>M.Tech- Biotechnology</td>
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<tr>
<td>3.</td>
<td>M.Tech- Nano Technology</td>
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<tr>
<td>4.</td>
<td>M.Tech- Food Processing</td>
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<tr>
<td>5.</td>
<td>M.Tech- Avionics</td>
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</tbody>
</table>
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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</thead>
<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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<tbody>
<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>
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<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>
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<td>3.</td>
<td>Impersonates any other candidate in connection with the examination.</td>
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<td>4.</td>
<td>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>
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<td>the examination.</td>
<td>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. Cancellation of the performance in that subject.</td>
</tr>
<tr>
<td>5.</td>
<td>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.</td>
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<tr>
<td>6.</td>
<td>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</td>
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<td><strong>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.</strong></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><strong>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.</strong></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>
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<tr>
<td><strong>8. Possess any lethal weapon or firearm in the examination hall.</strong></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. 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>
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<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>
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<tr>
<td>10.</td>
<td>Comes in a drunken condition to the examination hall.</td>
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<tr>
<td>11.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
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<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>
</tr>
</tbody>
</table>
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>Imprisonment upto</th>
<th>Fine Upto</th>
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</thead>
<tbody>
<tr>
<td>Teasing, Embarrassing and Humiliation</td>
<td>6 Months</td>
</tr>
<tr>
<td>Assaulting or Using Criminal force or Criminal intimidation</td>
<td>1 Year</td>
</tr>
<tr>
<td>Wrongfully restraining or confining or causing hurt</td>
<td>2 Years</td>
</tr>
<tr>
<td>Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence</td>
<td>5 Years</td>
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<tr>
<td>Causing death or abetting suicide</td>
<td>10 Months</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.

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

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<td>Coding Theory and Applications</td>
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<td>Transform Techniques</td>
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<td>Advanced Digital Signal Processing</td>
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<td>Statistical Signal Processing</td>
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### II SEMESTER

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<td>Image &amp; Video Processing</td>
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<td>Wireless Communication &amp; Networks</td>
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<td>DSP Processors and Architectures</td>
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<td>Detection and Estimation Theory</td>
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### III – SEMESTER

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### IV – SEMESTER

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The project will be evaluated at the end of the IV Semester
SYLLABUS

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CODING THEORY AND APPLICATIONS

UNIT – I

**Coding for Reliable Digital Transmission and Storage:** Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

**Linear Block Codes:** Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system.

UNIT – II

**Cyclic Codes:** Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT – III

**Convolutional Codes:** Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT – IV

**Burst –Error-Correcting Codes:** Decoding of Single-Burst error Correcting Cyclic codes, Single-Burst-Error-Correcting Cyclic codes, Burst-Error-Correcting Convolutional Codes, Bounds on Burst Error-Correcting Capability, Interleaved Cyclic and Convolutional Codes, Phased-Burst –Error-Correcting Cyclic and Convolutional codes.
UNIT-V

BCH – Codes: BCH code- Definition, Minimum distance and BCH Bounds, Decoding Procedure for BCH Codes- Syndrome Computation and Iterative Algorithms, Error Location Polynomials and Numbers for single and double error correction.

TEXTBOOKS:


REFERENCE BOOKS:

1. Digital Communications-Fundamental and Application - Bernard Sklar, PE.
3. Introduction to Error Control Codes-Salvatore Gravano-oxford
5. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Ed, 2009, TMH.
UNIT-I


UNIT-II

Transforms: Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT, Singular value Decomposition – definition, properties and applications.

UNIT-III


UNIT-IV

Multi Rate Analysis and DWT: Need for Scaling function – Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks, Daubechies Wavelet Function, Applications of DWT.

UNIT-V

TEXT BOOKS:


REFERENCE BOOKS:


UNIT – I

Review of DFT, FFT, IIR Filters and FIR Filters: Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion.

UNIT – II


UNIT – III

Non-Parametric Methods of Power Spectral Estimation: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametric methods

UNIT – IV

Implementation of Digital Filters: Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT – V

TEXT BOOKS:


REFERENCE BOOKS:

UNIT-I

**Digital Modulation Schemes:** BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

UNIT-II


UNIT-III

**Error Correction:** Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code

**Data Link Control:** Line Discipline, Flow Control, Error Control


UNIT-IV

**Multiplexing:** Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL.

**Local Area Networks:** Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI.

**Metropolitan Area Networks:** IEEE 802.6, SMDS

**Switching:** Circuit Switching, Packet Switching, Message Switching.

**Networking and Interfacing Devices:** Repeaters, Bridges, Routers, Gateway, Other Devices.
UNIT-V

Multiple Access Techniques: Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization, Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA), OFDM and OFDMA.

TEXTBOOKS:

REFERENCE BOOKS:
1. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
UNIT-I

**Signal models and characterization:** Types and properties of statistical models for signals and how they relate to signal processing. Common second-order methods of characterizing signals including autocorrelation, partial correlation, cross-correlation, power spectral density and cross-power spectral density.

UNIT-II

**Spectral estimation:** Nonparametric methods for estimation of power spectral density, autocorrelation, cross-correlation, transfer functions, and coherence from finite signal samples.

UNIT-III

**Review of signal processing:** A review on random processes, a review on filtering random processes, Examples.

**Statistical parameter estimation:** Maximum likelihood estimation, maximum a posterior estimation, Cramer-Rao bound.

UNIT-IV

**Eigen structure based frequency estimation:** Pisarenko, MUSIC, ESPRIT and their application to sensor array direction finding.

**Spectrum estimation:** Moving average (MA), Auto Regressive (AR), Auto Regressive Moving Average (ARMA), Various non-parametric approaches.

UNIT-V

**Wiener filtering:** The finite impulse case, causal and non-causal infinite impulse responses cases, Least mean squares adaptation, recursive least squares adaptation, Kalman filtering.
TEXT BOOKS:


REFERENCE BOOKS:

UNIT-I


**Modern Techniques:** Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT-II


**Conventional Encryption:** Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT-III

**Public Key Cryptography:** Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography. **Number Theory:** Prime and Relatively prime numbers, Modular arithmetic, Fermat’s and Euler’s theorems, Testing for primality, Euclid’s Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT-IV


UNIT-V


Intruders, Viruses and Worms

Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

TEXTBOOKS:


REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
5. Introduction to Cryptography, Buchmann, Springer.
UNIT-I

**Introduction:** Fundamental problems in pattern Recognition system design, Design concepts and methodologies, Simple pattern recognition model.

**Decisions and Distance Functions:** Linear and generalized decision functions, Pattern space and weight space, Geometrical properties, implementations of decision functions, Minimum-distance pattern classifications.

**Probability - Probability of events:** Random variables, Joint distributions and densities, Movements of random variables, Estimation of parameter from samples.

UNIT–II

**Decision making** - Baye’s theorem, Multiple features, Conditionally independent features, Decision boundaries, Unequal cost of error, estimation of error rates, the leaving-one-out-techniques, characteristic curves, estimating the composition of populations. Baye’s classifier for normal patterns.

**Non Parametric Decision Making:** histogram, kernel and window estimation, nearest neighbour classification techniques. Adaptive decision boundaries, adaptive discriminant functions, Minimum squared error discriminant functions, choosing a decision making techniques.

UNIT–III

**Clustering and Partitioning:** Hierarchical Clustering: Introduction, agglomerative clustering algorithm, the single-linkage, complete-linkage and average-linkage algorithm. Ward’s method Partition clustering-Forg’s algorithm, K-means’s algorithm, Isodata algorithm.
UNIT-IV

**Pattern Preprocessing and Feature selection:** distance measures, clustering transformation and feature ordering, clustering in feature selection through entropy minimization, features selection through orthogonal expansion, binary feature selection.

UNIT-V

**Syntactic Pattern Recognition and Application of Pattern Recognition:** Concepts from formal language theory, formulation of syntactic pattern recognition problem, syntactic pattern description, recognition grammars, automata as pattern recognizers, Application of pattern recognition techniques in bio-metric, facial recognition, IRIS scon, Finger prints, etc.,

**REFERENCE BOOKS:**

1. Pattern recognition and Image Analysis, Gose. Johnsonbaugh Jost, PHI.
EMBEDDED AND REAL TIME OPERATING SYSTEMS

**UNIT-I**


**UNIT-II**

**RTOS Programming** Basic Functions and Types of RTOS for Embedded Systems, RTOS mCOS-II, RTOS Vx Works, Programming concepts of above RTOS with relevant Examples, Programming concepts of RTOS Windows CE, RTOS OSEK, RTOS Linux 2.6.x and RTOS RT Linux.

**UNIT-III**

**Program Modeling – Case Studies** Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using Mucos RTOS, case study of digital camera hardware and software architecture, case study of coding for sending application layer byte streams on a TCP/IP Network Using RTOS Vx Works, Case Study of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System for a Smart Card, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

**UNIT-IV**


Overview and programming concepts of Unix/Linux Programming, Shell Programming, System Programming.
UNIT-V

Programming in RT Linux Overview of RT Linux, Core RT Linux API, Program to display a message periodically, semaphore management, Mutex, Management, Case Study of Appliance Control by RT Linux System.

TEXT BOOKS:


REFERENCES:


UNIT – I

Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT – II

Artificial Neural Networks: Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT – III

Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT – IV

Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and ant-colony search techniques for solving optimization problems.

UNIT – V

Applications: GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis
of Neural-Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems.

**TEXT BOOKS:**


**REFERENCE BOOKS:**


OBJECT ORIENTED PROGRAMMING

Objective: Implementing programs for user interface and application development using core java principles

UNIT-I

Objective: Focus on object oriented concepts and java program structure and its installation

Introduction to OOP
Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Installation of JDK1.6

UNIT-II

Objective: Comprehension of java programming constructs, control structures in Java

Programming Constructs
Variables , Primitive Datatypes, Identifiers- Naming Conventions, Keywords, Literals, Operators-Binary,Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control-Branching,Conditional, loops., Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

UNIT-III

Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package

Exceptions & Assertions - Introduction, Exception handling
UNIT-IV

Objective: Understanding of Thread concepts and I/O in Java

MultiThreading: java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading, Synchronization, suspending and Resuming threads, Communication between Threads

Input/Output: reading and writing data, java.io package.

UNIT-V

Objective: Being able to build dynamic user interfaces using applets and Event handling in java

Applets- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()

Event Handling - Introduction, Event Delegation Model, java.awt.event Description, Event Listeners, Adapter classes, Inner classes

UNIT-VI

Objective: Understanding of various components of Java AWT and Swing and writing code snippets using them

Abstract Window Toolkit

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

Swing: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScrollPane, Split Pane, JTabbedPane, Dialog Box

TEXT BOOKS:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson

REFERENCE BOOKS:

1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
### SIGNAL PROCESSING LAB

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**Note:**

A. Minimum of 10 Experiments have to be conducted

B. All Experiments may be Simulated using MATLAB and to be verified theoretically.

1. Basic Operations on Signals, Generation of Various Signals and finding its FFT.
2. Program to verify Decimation and Interpolation of a given Sequences.
3. Program to Convert CD data into DVD data
4. Generation of Dual Tone Multiple Frequency (DTMF) Signals
5. Plot the Periodogram of a Noisy Signal and estimate PSD using Periodogram and Modified Periodogram methods
6. Estimation of Power Spectrum using Bartlett and Welch methods
7. Verification of Autocorrelation Theorem
8. Parametric methods (Yule-Walker and Burg) of Power Spectrum Estimation
9. Estimation of data series using Nth order Forward Predictor and comparing to the Original Signal
10. Design of LPC filter using Levinson-Durbin Algorithm
11. Computation of Reflection Coefficients using Schur Algorithm
12. To study Finite Length Effects using Simulink
13. Design and verification of Matched filter
15. Design and Simulation of Notch Filter to remove 60Hz Hum/any unwanted frequency component of given Signal (Speech/ECG)
UNIT –I

Introduction to Adaptive Systems:


UNIT –II

Development of Adaptive Filter Theory & Searching the Performance surface:


Searching the performance surface – Methods & Ideas of Gradient Search methods - Gradient Searching Algorithm & its Solution - Stability & Rate of convergence - Learning Curves.

UNIT –III


UNIT –IV


UNIT –V

TEXT BOOKS:

REFERENCE BOOKS:
UNIT–I

**Fundamentals of Image Processing and Image Transforms:**
Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing

Introduction, Need for transform, image transforms, Fourier transform, 2D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform, Discrete cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms.

UNIT–II

**Image Enhancement:** Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

**Frequency domain methods:** Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

**Image Restoration:** Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind deconvolution

UNIT–III

**Image Segmentation:** Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation, Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour

**Image Compression:** Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes,

UNIT -IV

**Basic Steps of Video Processing:** Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT –V

**2-D Motion Estimation:** Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

**TEXT BOOKS:**


**REFERENCE BOOKS:**

UNIT I


UNIT II


UNIT III

**Mobile Radio Propagation:** Small-Scale Fading and Multipath Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading
effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Claire’s model for flat fading, spectral shape due to Doppler spread in Claire’s model, Simulation of Claire and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT-IV


UNIT-V

**Wireless Networks** Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access Control, Comparision of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL.

**TEXTBOOKS:**


**REFERENCE BOOKS:**

2. Wireless Digital Communications – Kamilo Feher, 1999, PHI.
UNIT –I


Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT –II

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT –III

Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT –IV

Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT –V

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:


REFERENCE BOOKS:

4. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
UNIT-I


UNIT-II


UNIT-III


UNIT-IV

UNIT-V

**Oscillators:** Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer. **RF Mixers:** Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers, Frequency domain considerations.

**TEXT BOOKS:**


**REFERENCE BOOKS:**

1. Radio frequency and Microwave Electronics - Mathew M.Radmangh, 2001, PE Asia Publ.
UNIT –I


UNIT –II

**Time Domain Models for Speech Processing**: Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT –III


UNIT –IV


**Speech Enhancement**: Nature of interfering sounds, Speech

UNIT-V

Automatic Speech & Speaker Recognition: Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System

Hidden Markov Model (HMM) for Speech: Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS,

Speaker Recognition: Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

TEXTBOOKS:


REFERENCE BOOKS:

UNIT-I


UNIT-II

**Data Compression Techniques**: Lossy and Lossless data reduction Algorithms, ECG data compression using Turning point, AZTEC, CORTES, Huffman coding, vector quantisation, DICOM Standards

UNIT-III

**Cardiological Signal Processing**: Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia Detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition.


UNIT-IV

**Signal Averaging, Polishing**: Mean and trend removal, Prony’s method, Prony’s Method based on the Least Squares Estimate, Linear prediction, Yule – Walker (Y –W) equations, Analysis of Evoked Potentials.

UNIT-V

**Neurological Signal Processing**: Modelling of EEG Signals, Detection of spikes and spindles Detection of Alpha, Beta and Gamma Waves, Auto Regressive (A.R.) modelling of seizure EEG, Sleep Stage analysis, Inverse Filtering, Least squares and polynomial modelling.
TEXT BOOKS:


REFERENCE BOOKS:


UNIT I

**Internetworking Concepts:** Principles of Internetworking, Connectionless Internetworking, Application level Interconnections, Network level Interconnection, Properties of the Internet, Internet Architecture, Wired LANS, Wireless LANs, Point-to-Point WANs, Switched WANs, Connecting Devices, TCP/IP Protocol Suite.

**IP Address: Classful Addressing:** Introduction, Classful Addressing, Other Issues, Sub-netting and Super-netting

**Classless Addressing:** Variable length Blocks, Sub-netting, Address Allocation. Delivery, Forwarding, and Routing of IP Packets: Delivery, Forwarding, Routing, Structure of Router.

**ARP and RARP:** ARP, ARP Package, RARP.

UNIT II

**Internet Protocol (IP):** Datagram, Fragmentation, Options, Checksum, IPV6.

**Transmission Control Protocol (TCP):** TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Flow Control, Error Control, Congestion Control, TCP Times.

**Stream Control Transmission Protocol (SCTP):** SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control.

**Mobile IP:** Addressing, Agents, Three Phases, Inefficiency in Mobile IP.

**Classical TCP Improvements:** Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission/Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.

UNIT III

**Unicast Routing Protocols (RIP, OSPF, and BGP):** Intra and Inter-domain Routing, Distance Vector Routing, RIP, Link State Routing,
Multicasting and Multicast Routing Protocols: Unicast - Multicast-Broadcast, Multicast Applications, Multicast Routing, Multicast Link State Routing: MOSPF, Multicast Distance Vector: DVMRP.

UNIT-IV

Domain Name System (DNS): Name Space, Domain Name Space, Distribution of Name Space, and DNS in the internet.

Remote Login TELNET: Concept, Network Virtual Terminal (NVT).


Electronic Mail: SMTP and POP.


UNIT-V


TEXTBOOKS:
2. Internetworking with TCP/IP Comer 3rd edition PHI

REFERENCE BOOKS:
UNIT I


UNIT II


UNIT III


UNIT IV

**Pulse Compression in Radar Signals:** Introduction, Significance, Types, Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and

UNIT V

**Phase Coding Techniques:** Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar.

**Poly Phase Codes:** Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Sidelobe Reduction for Phase Coded PC Signals.

**TEXTBOOKS:**


**REFERENCE BOOKS:**

UNIT – I:

**Random Processes:** Discrete Linear Models, Markov Sequences and Processes, Point Processes, and Gaussian Processes.

UNIT – II:

**Detection Theory:** Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of Error Classifier, Bayes Decision Rule, Multiple-Class Problem (Bayes)- minimum probability error with and without equal a priori probabilities, Neyman-Pearson Classifier, General Calculation of Probability of Error, General Gaussian Problem, Composite Hypotheses.

UNIT – III:

**Linear Minimum Mean-Square Error Filtering:** Linear Minimum Mean Squared Error Estimators, Nonlinear Minimum Mean Squared Error Estimators. Innovations, Digital Wiener Filters with Stored Data, Real-time Digital Wiener Filters, Kalman Filters.

UNIT – IV:

**Statistics:** Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, Point Estimators of Parameters, Measures of the Quality of Estimators, Introduction to Interval Estimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, Multiple Linear Regression.

UNIT – V:

**Estimating the Parameters of Random Processes from Data:** Tests for Stationarity and Ergodicity, Model-free Estimation, Model-based Estimation of Autocorrelation Functions, Power Special Density Functions.
TEXT BOOKS:

REFERENCE BOOKS:
3. Introduction to Statistical Signal Processing with Applications - Srinath, Rajasekaran, Viswanathan, 2003, PHI.
Note:

A. Minimum of 10 Experiments have to be conducted

B. All Simulations are be carried out using MATLAB/DSP Processors/ Labview Software & DSP Kits

1. Study of various addressing modes of DSP using simple programming examples
2. Generation of waveforms using recursive/filter methods
3. Sampling of input signal and display
4. Implementation of Linear and Circular Convolution for sinusoidal signals
5. Framing & windowing of speech signal.
6. Finding voiced & unvoiced detection for each frame of speech signal.
7. IIR Filter implementation using probe points
8. Implementation of FIR filters on DSP processor
9. Loop back using DSK kit
10. Real time signal enhancement using Adaptive Filter.
11. Representation of different Q-formats using GEL function
12. Verification of Finite word length effects (Overflow, Coefficient Quantization, Scaling and Saturation mode in DSP processors)
13. Image enhancement using spatial & frequency domain
15. Extraction of frames from Video signal