SANTHIRAM ENGINEERING COLLEGE :: NANDYAL
(AUTONOMOUS)
Approved by A.I.C.T.E., New Delhi, Permanently Affiliated to JNT University, Ananthapuramu
Accredited by NAAC with Grade-A, Accredited by NBA (ECE & CSE)
An ISO 9001:2015 Certified Institution, 2(f) & 12(B) recognition by UGC Act, 1956
NH-40, NANDYAL-518501 (Dist), A.P.

Learn-Grow-Empower

ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABI

M.TECH (ECE-EMBEDDED SYSTEMS)

Regular Two Year PG Degree Course

(Applicable for the Admitted Batch 2025-26)

REGULATIONS:
R-25

principal@srecnandyal.edu.in
www.srecnandyal.edu.in

SANTHIRAM ENGINEERING COLLEGE : NANDYAL

ACADEMIC RULES & REGULATIONS

(Effective for the students admitted into I year from the Academic Year 2025-2026)

Santhiram Engineering College, Nandyal (SREC) offers **Two** Years (**Four** Semesters) full-time Master of Technology (M. Tech) Degree programme, under Choice Based Credit System (CBCS) in different branches of Engineering and Technology with different specializations.

The Santhiram Engineering College, Nandyal (SREC) shall confer M. Tech degree on candidates who are admitted to the programme and fulfill all the requirements for the award of the degree.

1. Award of the M. Tech Degree

A student will be declared eligible for the award of the M. Tech degree if he/she fulfils the following:

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

1.2 Registers for 75 credits and secures all 75 credits.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within four academic years from the year of their admission, shall forfeit their seat in M. Tech course and their admission stands cancelled.

3. Programme of Study:

The following M. Tech Specializations are offered at present in different branches of Engineering and Technology in non-autonomous affiliated colleges:

S.No.	Discipline	Name of the Specialization	Code
01	Electronics and Communication Engineering	Embedded Systems	55
		VLSI System Design	57
02	Computer Science and Engineering	Computer Science & Engineering	58
		CSE (Artificial Intelligence & Machine Learning)	13

4. Eligibility for Admissions:

4.1 Admission to the M. Tech Program shall be made subject to the eligibility, qualification and specialization prescribed by the A.P. State Government/University from time to time.

4.2 Admissions shall be made either on the basis of either the merit rank or Percentile obtained by the qualified student in the relevant qualifying GATE Examination/ the merit rank obtained by the qualified student in an entrance test conducted by A.P. State Government (APPGECET) for M. Tech programmes an entrance test conducted by University/on the basis of any other exams approved by the University, subject to reservations as laid down by the Govt. from time to time.

5. Programme related terms:

5.1 ***Credit:*** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit

5.2 ***Academic Year:*** Two consecutive (one odd + one even) semesters constitute one academic year.

5.3 ***Choice Based Credit System (CBCS):*** The CBCS provides choice for students to select from the prescribed courses.

6. Programme Pattern:

6.1 Total duration of the of M. Tech programme is two academic years

6.2 Each academic year of study is divided into two semesters.

6.3 Each Semester shall be of 22 weeks duration (inclusive of Examinations), with a minimum of 90 instructional days per semester.

6.4 The student shall not take more than four academic years to fulfill all the academic requirements for the award of M. Tech degree from the date of commencement of first year first semester, failing which the student shall forfeit the seat in M. Tech programme.

6.5 The medium of instruction of the programme (including examinations and project reports) will be in English only.

6.6 All subjects/courses offered for the M. Tech degree programme are broadly classified as follows:

S. No.	Broad Course Classification	Course Category	Description
1.	Core Courses	Foundational & Professional Core Courses (PC)	Includes subjects related to the parent discipline/department/branch of Engineering
2.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline which are of importance in the context of special skill development
3.	Mandatory Course	Quantum Technology and Application	To understand importance of latest technologies, research and process of creation of patents through research
		Research methodology & IPR	
4.		Skill Enhancement courses (SE)	Interdisciplinary / job-oriented/domain courses which are relevant to the industry
		Comprehensive Viva	To test the overall domain knowledge
		Short Term Industry Internship	To provide real time exposure
		Dissertation	To provide application of domain knowledge to solve real problems
5.	Audit Courses	Mandatory noncredit courses	Covering subjects of developing desired attitude among the learners.

6.7 The college shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

6.8 A faculty advisor/mentor shall be assigned to each specialization to advise students on the programme, its Course Structure and Curriculum, Choice of Courses, based on his competence, progress, pre-requisites and interest.

6.9 Preferably 25% course work for the theory courses in every semester shall be conducted in the blended mode of learning.

7. Attendance Requirements:

7.1 A student shall be eligible to appear for the external examinations if he/she acquires i) a minimum of 50% attendance in each course and ii) 75% of attendance in aggregate of all the courses.

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

7.3 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence

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

7.5 A stipulated fee shall be payable towards condonation of shortage of attendance.

7.6 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek re-admission into that semester when offered next.

7.7 If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

7.8 If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

8. Evaluation – Distribution and Weightage of Marks:

The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned), for a maximum of 100 marks for theory and 100 marks for practical, based on Internal Evaluation and End Semester Examination.

8.1 There shall be five units in each of the theory subjects. For the theory subjects 60 marks will be for the End Examination and 40 marks will be for Internal Evaluation.

8.2 Two Internal Examinations shall be conducted for 30 marks each, one in the middle of the Semester and the other immediately after the completion of instruction period. The other 10 marks is awarded for continuous assessment in the form of assignments, quizzes, open book examination, presentation, etc. First mid examination shall be conducted for I & II units of the syllabus and second mid

examination for III, IV & V units. Each mid exam shall be conducted for a total duration of 120 minutes with 3 questions (without choice) and each question carries 10 marks. Final Internal marks for a total of 40 marks shall be arrived at by considering the marks secured by the student in both the internal examinations with 80% weightage to the better internal exam and 20% to the other.

8.3 The following pattern shall be followed in the End Examination:

i. Five questions shall be set from each of the five units with either/or type for 12 marks each.
ii. All the questions have to be answered compulsorily.
iii. Each question may consist of one, two or more bits.

8.4 For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day-to-day performance.

The internal evaluation based on the day-to-day work-10 marks, record- 10 marks and the remaining 20 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the examiners, with a breakup mark of Procedure-10, Experimentation-25, Results-10, Viva- voce-15.

8.5 There shall be Mandatory **Audit courses** in I & II semesters for zero credits. There is no external examination for audit courses. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 50% or more in the internal examinations. In case, the student fails, a re- examination shall be conducted for failed candidates for 40 marks for every six months/semester satisfying the conditions mentioned in item 1 & 2 of the regulations.

8.6 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 Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

8.7 In case the candidate does not secure the minimum academic requirement in any of the subjects he/she has to reappear for the Semester Examination either supplementary or regular in that subject or repeat the course when next offered or do any other specified subject as may be required.

8.8 The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the Institution norms and shall be produced to the Committees of the University as and when the same are asked for.

9. Credit Transfer Policy

As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the Institution shall allow up to a maximum of 40% of the Professional and Open Electives in a semester through SWAYAM/SWAYAM Plus.

9.1 The Institution shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses through SWAYAM platform.

9.2 The online learning courses available on the SWAYAM platform will be considered for credit transfer. SWAYAM course credits are as specified in the platform

9.3 Student registration for the MOOCs shall be only through the institution, it is mandatory for the student to share necessary information with the institution

9.4 The institution shall select the courses to be permitted for credit transfer through SWAYAM. However, while selecting courses in the online platform institution would essentially avoid the courses offered through the curriculum in the offline mode.

9.5 The institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer in the forthcoming Semester.

9.6 Students may register for an 8-week (2 credits) or 12-week (3 credits) SWAYAM / SWAYAM plus course with the approval of the Head of the Department (HoD).

9.7 Examination fees, if applicable, shall be borne by the student. Pass marks and grading will be as per the Institution academic regulations.

9.8 A student must get minimum 40% marks for assignments and quizzes on the SWAYAM/ SWAYAM plus platform to be eligible for the end-semester examination. The students who are unable to get minimum internal marks in SWAYAM/ SWAYAM plus platform, they have to re-register for the course in subsequent semester through SWAYAM/ SWAYAM plus platform.

9.9 The end-semester exam may be conducted by the National Testing Agency (NTA), the National Programme on Technology Enhanced Learning (NPTEL) or the Institution during the regular end-term exams. Evaluation shall comprise 60% weightage for the end-semester examination and 40% for assignments and quizzes conducted by the SWAYAM/ SWAYAM plus course coordinator. The student has to get 50% marks for internal and external with minimum of 40% marks in the external examination to declare them as pass.

9.10 The institution shall also ensure that the student has to complete the course and produce the course completion certificate as per the academic schedule given for the regular courses in that semester. However, the credits will be transferred to the students who got minimum 50% marks with 40% marks in the external examination

9.11 The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.

9.12 The Institution shall ensure no overlap of SWAYAM MOOC exams with that of the Institution examination schedule. In case of delay in SWAYAM results, the Institution will re-issue the marks sheet for such students.

9.13 Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the minimum 50% of marks and grades.

9.14 The respective Departments shall submit the following to the examination section of the Institution:

a) List of students who have passed MOOC courses in the current semester along with the certificates of completion.

b) Undertaking form filled by the students for credit transfer.

9.15 The Institution shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall also be permitted to register for MOOCs offered through online platforms other than SWAYAM NPTEL. In such cases, credit transfer shall be permitted only

after seeking approval of the Institution/University at least three months prior to the commencement of the semester.

10. Re-registration for Improvement of Internal Evaluation Marks:

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

10.1 The candidate should have completed the course work and obtained examinations results for **I, II and III** semesters.

10.2 The candidate should have passed all the subjects for which the Internal Evaluation marks secured are more than 50%.

10.3 Out of the subjects the candidate has failed in the examination due to Internal Evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of **three** Theory subjects for Improvement of Internal evaluation marks.

10.4 The candidate has to re-register for the chosen subjects and fulfill the academic requirements.

10.5 For each theory subject, the candidate has to pay the requisite fee along with the requisition through concerned Head of the department.

10.6 In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the reregistered subjects stand cancelled.

11. Evaluation of Project/Dissertation Work:

The Project work shall be initiated at the beginning of the III Semester and the duration of the Project is of two semesters. Evaluation of Project work is for 300 marks with 200 marks for internal evaluation and 100 marks for external evaluation. Progress of the project work is monitored through three reviews:

- Project review – I at the beginning of the III semester for zero marks
- Project review – II at the end of the third semester for 100 marks
- Project review – III before submission of the thesis i.e., end of the IV semesters for 100 marks

External evaluation of final Project work viva voce in IV semester shall be for 100 marks.

A Project Review Committee (PRC) shall be constituted with the Head of the Department as Chairperson, Project Supervisor and one faculty member of the department offering the M. Tech programme.

11.1 A candidate is permitted to register for the Project Work in III Semester after satisfying the attendance requirement in all the subjects, both theory and laboratory (in I & II semesters).

11.2 A candidate is permitted to submit Project dissertation with the approval of PRC. The candidate has to pass all the theory, practical and other courses before submission of the Thesis.

11.3 Project work shall be carried out under the supervision of teacher in the parent department concerned.

11.4 A candidate shall be permitted to work on the project in an industry/research organization on the recommendation of the Head of the Department. In such cases, one of the teachers from the department concerned would be the internal guide and an expert from the industry/ research organization concerned shall act as co-supervisor/

external guide. It is mandatory for the candidate to make full disclosure of all data/results on which they wish to base their dissertation. They cannot claim confidentiality simply because it would come into conflict with the Industry‟s or R&D laboratory‟s own interests. A certificate from the external supervisor is to be included in the dissertation.

11.5 Continuous assessment of Project Work - I and Project Work – II in III & IV semesters respectively will be monitored by the PRC.

11.6 The candidate shall submit status report by giving seminars in three different phases (two in III semester and one in IV semester) during the project work period. These seminar reports must be approved by the PRC before submission of the Project Thesis.

11.7 After registration, a candidate must present in Project Review - I, in consultation with his Project Supervisor, the title, objective and plan of action of his Project work to the PRC for approval within four weeks from the commencement of III Semester. Only after obtaining the approval of the PRC can the student initiate the project work.

11.8 The Project Review - II in III semester carries internal marks of 100. Evaluation should be done by the PRC for 50 marks and the Supervisor will evaluate the work for the other 50 marks. The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey in the same domain and progress of the Project Work.

11.9 A candidate has to secure a minimum of 50% of marks to be declared successful in Project Review - II. Only after successful completion of Project Review – II, candidate shall be permitted for Project Work Review – III in IV Semester. The unsuccessful students in Project Review - II shall reappear after three months.

11.10 The Project Review - III in IV semester carries 100 internal marks. Evaluation should be done by the PRC for 50 marks and the Supervisor will evaluate it for the other 50 marks. The PRC will examine the overall progress of the Project Work and decide whether or not eligible for final submission. A candidate has to secure a minimum of 50% of marks to be declared successful in Project Review - III. If student fails to obtain the required minimum marks, he/she has to reappear for Project Review - III after a month.

11.11 For the approval of PRC the candidate shall submit the draft copy of dissertation to the Head of the Department and make an oral presentation before the PRC.

11.12 After approval from the PRC, the student is permitted to submit a report. The dissertation report will be accepted only when the plagiarism is within 30% checked through Turnitin software (repository mode). The plagiarism report shall be submitted along with the dissertation report.

11.13 Research paper related to the Project Work shall be published in an SCI/ESCI/Scopus/UGC Care listed journal, or in conference proceedings with ISBN number organized by professional societies such as IEEE, IEI, etc.

11.14 After successful plagiarism check and publication of research paper, three copies of the dissertation certified by the supervisor and HOD shall be submitted to the College.

11.15 The dissertation shall be adjudicated by an external examiner selected by the Institution. For this, the Principal of the College shall submit a panel of three examiners as submitted by the supervisor concerned and department head for each student. However, the dissertation will be adjudicated by one examiner nominated by the Head of the Institution.

11.16 If the report of the examiner is not satisfactory, the candidate shall revise and resubmit the dissertation, in the time frame as decided by the PRC. If report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate has to reregister for the project and complete the project within the stipulated time after the approval from the Institution.

11.17 If the report of the examiner is satisfactory, the Head of the Department shall coordinate and make arrangements for the conduct of Project Viva voce exam.

11.18 The Project Viva voce examinations shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who has adjudicated the dissertation. For Dissertation Evaluation (Viva voce) in IV Sem. there are external marks of 100 and it is evaluated by external examiner. The candidate has to secure a minimum of 50% marks in Viva voce exam.

11.19 If he fails to fulfill the requirements as specified, he will reappear for the Project Viva voce examination only after three months. In the reappeared examination also, if he fails to fulfill the requirements, he will not be eligible for the award of the degree.

12. Industry Internships:

Industry internship either onsite or virtual with a minimum of 06-08 weeks" duration, done at the end of 1st year second semester. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the PG program. The student shall register for the internship as per course structure after commencement of academic year.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, Mentor/Supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. Internship will be evaluated for 100 marks with 50 marks for the report evaluated by the mentor and 50 marks for oral presentation. A student should secure minimum 50% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the Institution.

13. Comprehensive Viva

A Comprehensive Viva shall be conducted after the II Semester examinations for 100 marks by a committee consisting of the Head of the Department, one senior faculty member of the same specialization, and an external subject expert appointed by the Head of the Institution. The student must secure a minimum of 50% marks to be declared as passed

14. Credits for Co-curricular Activities

The college shall be introducing Co-Curricular activities in IV semester with One credit. The student must be participating in Co-Curricular / extra-curricular activities such as publishing a paper or participating in a National / International workshops / symposium / seminar / training organized by any private institution / Govt. organization / Training centers in virtual/offline mode. The student has to participate in Co-Curricular activities during their program duration and submit the certificate at the end of the IV semester. If he/she fails to submit will not be eligible for the award of degree. In such cases, the student shall repeat and submit the Co-Curricular activity.

Following are the guidelines for awarding Credits for Co-curricular Activities

Name of the Activity	Maximum Credits / Activity
Participation in National Level Seminar/ Conference / Workshop /Training programs (related to the specialization of the student)	0.5
Participation in International Level Seminar / Conference / workshop/Training programs held outside India (related to the specialization of the student)	1
Academic Award/Research Award from State Level/National Agencies	0.5
Academic Award/Research Award from International Agencies	1
Research / Review Publication in National Journals (Indexed in Scopus / Web of Science)	0.5
Research / Review Publication in International Journals with Editorial board outside India (Indexed in Scopus / Web of Science)	1

Note:

i) Credit shall be awarded only for the first author. Certificate of attendance and participation in a Conference/Seminar is to be submitted for awarding credit. A minimum participation of five days is required to earn the necessary credits. Alternatively, the student may attend five different one day programs to meet this requirement.

ii) Certificate of attendance and participation in workshops and training programs (Internal or External) is to be submitted for awarding credit. The total duration should be at least one week.

iii) Participation in any activity shall be permitted only once for acquiring required credits under cocurricular activities

15. Grading:

As a measure of the student‟s performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points Assigned
≥ 90	S (Superior)	10
≥ 80 < 90	A (Excellent)	9
≥ 70 < 80	B (Very Good)	8
≥ 60 < 70	C (Good)	7
≥ 50 < 60	D (Pass)	6
< 50	F (Fail)	0
Absent	Ab (Absent)	0

i) A student obtaining Grade „F‟ or Grade „Ab‟ in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

ii) For noncredit audit courses, “Satisfactory” or “Unsatisfactory” shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

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

$$SGPA = \Sigma (C_i \times G_i) / \Sigma C_i$$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

i) The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \Sigma (C_i \times S_i) / \Sigma C_i$$

where "S_i" is the SGPA of the i^{th} semester and C_i is the total number of credits up to that semester.

ii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iii) While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D and F.

16. Award of Class:

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

Class Awarded	CGPA to be secured
First Class with Distinction	≥7.5%
First Class	< 7,5≥ 6.5
Pass Class	< 6.5

17. Exit Policy:

The student shall be permitted to exit with a PG Diploma based on his/her request to the university through the respective institution at the end of first year subject to passing all the courses in first year.

The University shall resolve any issues that may arise in the implementation of this policy from time to time and shall review the policy in the light of periodic changes brought by UGC, AICTE and State government.

18. Withholding of Results:

If the candidate has any case of in-discipline pending against him/her, the result of the candidate shall be withheld, and he/she will not be allowed/promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

19. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been

detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

20. General:

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

20.2 Disciplinary action for Malpractice/improper conduct in examinations is appended.

20.3 There shall be no places transfer within the constituent colleges and affiliated colleges of Jawaharlal Nehru Technological University Anantapur.

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

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

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

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RULES FOR

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled and handed over to the examination of the autonomous college.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical 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 four consecutive semesters from class work and all examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject only.
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 inor 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 Controller of Examinations / Assistant Controller of Examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	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. If the candidate physically assaults the invigilator/ Controller of Examinations / Assistant Controller of Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject only or in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations, depending on the recommendation of the committee.

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)
3. A show cause notice shall be issued to the college.
4. Impose a suitable fine on the college.
5. Shifting the examination centre from the college to another college for a specific period of not less than one year.

Note:-

Whenever the performance of a student is cancelled in any subject/subjects due to Malpractice, he has to register for End Examinations in that subject/subjects consequently and has to fulfil allthe norms required for the award of Degree.

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R-2025

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech
I-Semester Course Structure

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem. - Course Structure

S.No	Subject Code	Course Category	Name of the Subject	Hours/Week				Marks		
				Lecture	Tutorial	Practical	Credits	Internal	External	Total
1	25D55101	PC	EMBEDDED SYSTEM DESIGN	3	0	0	3	40	60	100
2	25D55102	PC	EMBEDDED PROGRAMMING	3	0	0	3	40	60	100
3	25D55103A	PE	WIRELESS SENSOR NETWORKS (PE-I)	3	0	0	3	40	60	100
4	25D55103B	PE	EMBEDDED SYSTEMS FOR ROBOTICS (PE-I)	3	0	0	3	40	60	100
5	25D55103C	PE	PATTERN RECOGNITION AND MACHINE LEARNING (PE-I)	3	0	0	3	40	60	100
6	25D55104A	PE	COMMUNICATIONS BUSES & INTERFACES (PE-II)	3	0	0	3	40	60	100
7	25D58103A	PE	ADVANCED COMPUTER ARCHITECTURE	3	0	0	3	40	60	100
8	25D55104C	PE	EMBEDDED SYSTEMS FOR AUTOMOBILE APPLICATIONS	3	0	0	3	40	60	100
9	25D55105	PC	EMBEDDED SYSTEM DESIGN LAB	2	0	0	2	40	60	100
10	25D55106	PC	EMBEDDED PROGRAMMING LAB	0	0	4	2	40	60	100
11	25D57107	MC(C)	RESEARCH METHODOLOGY AND IPR	2	0	0	2	40	60	100
12	25D55107	SC	EMBEDDED LINUX	0	1	2	2	40	60	100
13	25D57109A	MC(NC)	ENGLISH FOR RESEARCH PAPER WRITING	2	0	0	0	40	0	40
14	25D57109C	MC(NC)	DISASTER MANAGEMENT	2	0	0	0	40	0	40

R-2025

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech
I -Semester Syllabus

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D55101) EMBEDDED SYSTEM DESIGN

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I INTRODUCTION TO EMBEDDED SYSTEMS

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT-II TYPICAL EMBEDDED SYSTEM

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators. Onboard communication interfaces-I2C, SPI, CAN, parallel interface; External communication interfaces-RS232 and RS485, USB, infrared, Bluetooth, Wi-Fi, ZigBee, GPRS, GSM.

UNIT-III EMBEDDED FIRMWARE

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT-IV RTOS BASED EMBEDDED SYSTEM DESIGN

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling

UNIT-V TASK COMMUNICATION

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Device Drivers, How to Choose an RTOS.

TEXT BOOKS:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.
2. Computers as Components ???Wayne Wolf, Morgan Kaufmann (second edition)

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems, Lyla, Pearson, 2013.

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

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e-Resources and Digital Material:

1. Pattern Recognition - JNTU - Studocu

COURSE OUTCOMES:

1. Familiar the basics of pattern classes and functionality.
2. Construct the various linear models.
3. Use the different kernel methods
4. Design the Markov and Mixed models.
5. Apply and analyze mixture models and the EM algorithm for probabilistic clustering and data modelling.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D55102) EMBEDDED PROGRAMMING

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I BASIC C PROGRAMMING

Typical C Program Development Environment - Introduction to C Programming - Structured Program Development in C - Data Types and Operators - C Program Control - C Functions - Introduction to Arrays.

UNIT-II EMBEDDED C

Adding Structure to ???C??? Code: Object-oriented programming with C, Header files for Project and Port, Examples. Meeting Real-time constraints: Creating hardware delays- Need for timeout mechanism - Creating loop timeouts - Creating hardware timeouts.

UNIT-III 8051 PROGRAMMING IN C

Data types and time delay in 8051, I/O programming in 8051, Logic operations in 8051, Data conversion program in 8051 Accessing code ROM space in 8051, Data serialization using 8051

UNIT-IV 8051 SERIAL PORT AND INTERRUPT PROGRAMMING IN C

Basics of serial communication, 8051 interface to RS232- serial port programming in 8051. 8051 interrupts and programming, Programming for timer configuration.

UNIT-V 8051 INTERFACING

8051: ADC interfacing, DAC interfacing, Sensor interfacing, LCD interfacing, Stepper motor interfacing.

TEXT BOOKS:

1. Paul Deitel and Harvey Deitel, ???C How to Program???, 9th Edition, Pearson Education Limited, 2022, 1st edition.
2. Michael J Pont, "Embedded C", Addison-Wesley, An imprint of Pearson Education, 2002.
3. William von Hagen, "The Definitive Guide to GCC", 2nd Edition, Apress Inc., 2006.
4. Gowrishankar S and Veena A, "Introduction to Python Programming", CRC Press, Taylor & Francis Group, 2019.

REFERENCE BOOKS:

1. oel Kalicharan, ”Learn to Program with C”, Apress Inc., 2015, 1st edition

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

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2. Steve Oualline, ”Practical C programming”, O’Reilly Media, 1997, 3rd editio
3. Muhammad Ali Mazidi, Janice G. Mazidi and Rolin D. McKinlay, ???The 8051 Microcontroller and Embedded Systems??? Prentice Hall, 2nd Edition 2007.
4. Myke Predko, Programming and customizing the 8051 microcontrollers, McGraww Hill 2000, 1st edition.

e-Resources and Digital Material:

1. https://www.hackerrank.com/
2. https://www.cprogramming.com/
3. https://www.allaboutcircuits.com/technical-articles/introduction-to-the-c-programminglanguage-for-embedded-applications/
4. https://www.circuitstoday.com/getting-started-with-keil-uvision
5. https://microcontrollerslab.com/8051-microcontroller-tutorials-c/

COURSE OUTCOMES:

1. Understand basic C programming concepts, including data types, operators, and control structures.
2. Develop embedded C programs with structured code and real-time constraint management techniques.
3. Implement 8051 microcontroller programming in C, including I/O operations and data manipulation.
4. Program 8051 for serial communication, interrupts, and timer configurations in embedded systems.
5. Interface 8051 with various peripherals like ADC, DAC, sensors, LCD, and stepper motors.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D55103A) WIRELESS SENSOR NETWORKS (PE-I)

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I INTRODUCTION

Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.

UNIT-II INTRODUCTION TO ADHOC/SENSOR NETWORKS

Introduction to adhoc/sensor networks: Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering.

UNIT-III MAC PROTOCOLS

Issues in designing MAC protocols for adhoc wireless networks, design goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4.

UNIT-IV ROUTING PROTOCOLS

Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols.

UNIT-V QOS AND ENERGY MANAGEMENT

Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.

TEXT BOOKS:

1. C. Siva Ram Murthy, and B. S. Manoj, "AdHoc Wireless networks ", Pearson Education - 2008.

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc20_ee98/preview
2. https://www.nrtec.in/wp-content/uploads/2023/09/EMBEDDED-SYSTEMS.pdf

COURSE OUTCOMES:

1. Understand wireless communication fundamentals, including modulation techniques, channel characteristics, and wireless LANs/PANs.

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

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2. Analyze the architecture, challenges, and applications of ad-hoc and sensor networks.
3. Evaluate design goals and protocols for MAC layers in wireless and sensor networks
4. Classify and compare routing protocols for wireless networks,focusing on power-aware and hybrid techniques
5. Address QoS and energy management challenges, exploring power management schemes for wireless systems

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3	3	1	-	1	1	1
CO2	2	3	3	2	1	-	-	-	-
CO3	2	2	3	2	3	-	-	1	1
CO4	2	1	1	3	2	-	3	-	3
CO5	2	3	3	2	2	-	3	3	3

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D55103B) EMBEDDED SYSTEMS FOR ROBOTICS (PE-I)

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I INTRODUCTION TO ROBOTICS & AUTOMATION

Overview of Robotics & Automation-Principles and Strategies of Automation System - Hardware and software for Automation- Embedded Processors for Automation-Different Types of Robots -Various Generations of Robots - Asimov's Laws Of Robotics -Key components of a robot - Design Criteria for Selection of a Robot -Role of embedded system in Robotics and Automation - Recent trends.

UNIT-II SENSORS AND DRIVE SYSTEMS

Hydraulic, Pneumatic and Electric Drive Systems - Understanding how motor power, current torque, friction co-efficient affect the design of a Robot - Determination of Motor HP and Gearing Ratio - Variable Speed Arrangements. Sensors - Classification based on sensing type (including Optical, Acoustic, Magnetic) - Proximity Sensors -Ranging Sensors - Speed & Displacement Sensing - Tactile Sensors - Vision Sensing - Smart Sensors - MEMS sensors

UNIT-III MANIPULATORS AND GRIPPERS

Introduction to Manipulators - Joints and Degrees of Freedom - Construction of Manipulators - Manipulator Dynamics and Force Control - Electronic and Pneumatic Manipulator Control Circuits - End Effectors - Various Types Of Grippers- Design Considerations

UNIT-IV KINEMATICS AND PATH PLANNING

Kinematic Equations - Forward and Inverse Kinematics - Solution Of Inverse Kinematics Problem - Jacobian based Velocity Kinematics- Various Path Planning Algorithms - Hill Climbing Techniques - Robot Operating System - Simulation and modelling of a simple Path Planning application.

UNIT-V ROBOT CONTROL

Basics of control: Transfer functions, Control laws: P, PD, PID Non-linear and advanced controls. CASE STUDIES: Robot Cell Design - Humanoid Robot - Robots in healthcare applications - Robot Machine Interface -Robots in Manufacturing and Non-Manufacturing Applications.

TEXT BOOKS:

1. Mikell P. Weiss G.M., Nagel R.N., Odraj N.G., ???Industrial Robotics???, Mc Graw-Hill Singapore, 1996.

2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1998.
3. Saha, S.K., ???Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.
4. Deb. S.R.,???Robotics Technology And Flexible Automation???, John Wiley, USA 1992.

REFERENCE BOOKS:

1. Klafter R.D., Chimielewski T.A., Negin M., Robotic Engineering ,An Integrated Approach, PHI. 2.n Wesley, USA, 1991.
2. Mc Kerrow P.J. Introduction to Robotics, Addiso
3. Issac Asimov Robot, Ballantine Books, New York, 1986.

e-Resources and Digital Material:

1. https://nptel.ac.in/domains/discipline/115?course=115_9

COURSE OUTCOMES:

1. Understand robotics and automation principles, robot components, and embedded processors' roles.
2. Analyze motor and sensor systems, determining power, torque, and sensor types for robots.
3. Design manipulators and grippers, considering dynamics, force control, and end effectors.
4. Apply kinematic equations, inverse kinematics, and path planning algorithms for robotic motion.
5. Implement P, PD, PID control laws for robotic systems, exploring healthcare and manufacturing applications.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D55103C) PATTERN RECOGNITION AND MACHINE LEARNING (PE-I)

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I INTRODUCTION TO PATTERN RECOGNITION

Mathematical Formulation and Basic Functional Equation, Reduction of Dimensionality, Experiments in Pattern Classification, Backward Procedure for Both Feature Ordering- and Pattern Classification, Suboptimal Sequential Pattern Recognition, Nonparametric Design of Sequential Pattern Classifiers, Analysis of Optimal Performance and a Multiclass Generalization

UNIT-II LINEAR MODELS

Linear Basis Function Models -Maximum likelihood and least squares, Geometry of least squares , Sequential learning, Regularized least squares, Multiple outputs , The Bias-Variance Decomposition, Bayesian Linear Regression -Parameter distribution, Predictive, Equivalent, Bayesian Model Comparison, Probabilistic Generative Models-Continuous inputs, Maximum likelihood solution, Discrete features, Exponential family, Probabilistic Discriminative Models -Fixed basis functions, Logistic regression, Iterative reweighted least squares, Multiclass logistic regression, Probit regression, Canonical link functions

UNIT-III KERNEL METHODS

Constructing Kernels, Radial Basis Function Networks - Nadaraya-Watson model, Gaussian Processes -Linear regression revisited, Gaussian processes for regression, Learning the hyper parameters, Automatic relevance determination, Gaussian processes for classification, Laplace approximation, Connection to neural networks, Sparse Kernel Machines- Maximum Margin Classifiers, Overlapping class distributions, Relation to logistic regression, Multiclass SVMs, SVMs for regression, Computational learning theory, Relevance Vector Machines- RVM for regression, Analysis of sparsity, RVM for classification

UNIT-IV GRAPHICAL MODELS

Bayesian Networks, Example: Polynomial regression, Generative models, Discrete variables, Linear-Gaussian models, Conditional Independence- Three example graphs, D-separation, Markov Random Fields -Conditional independence properties, Factorization properties, Illustration: Image de-noising, Relation to directed graphs, Inference in Graphical Models- Inference on a chain, Trees, Factor graphs, The sum-product algorithm, The max-sum algorithm, Exact inference in general graphs, Loopy belief propagation, Learning the graph structure.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

UNIT-V MIXTURE MODELS AND EM ALGORITHM

K-means Clustering-Image segmentation and compression, Mixtures of Gaussians-Maximum likelihood, EM for Gaussian mixtures, An Alternative View of EM- Gaussian mixtures revisited, Relation to K-means, Mixtures of Bernoulli distributions, EM for Bayesian linear regression, The EM Algorithm in General, Combining Models- Tree-basedMixture Models, Conditional Mixture Models- Mixtures of linear regression models, Mixtures of logistic models, Mixtures of experts.

TEXT BOOKS:

1. Sequential methods in Pattern Recognition and Machine Learning-K.S.Fu, Academic Press, volume no.52.
2. Pattern Recognition and Machine Learning- C. Bishop-Springer,2006.

REFERENCE BOOKS:

1. Pattern Classification- Richard o. Duda, Peter E. hart, David G. Stork, John Wiley& Sons, 2nd Ed., 2001.
2. .The elements of Statistical Learning- Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, Springer, 2nd Ed., 2009.

e-Resources and Digital Material:

1. Pattern Recognition - JNTU - Studocu

COURSE OUTCOMES:

1. Familiar the basics of pattern classes and functionality.
2. Construct the various linear models.
3. Use the different kernel methods.
4. Design the Markov and Mixed models.
5. Apply and analyze mixture models and the EM algorithm for probabilistic clustering and data modelling.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D55104A) COMMUNICATIONS BUSES & INTERFACES (PE-II)

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I BUSSES
Serial Busses - Physical interface, Data and Control signals, features, limitations and applications of RS232, RS485, I2C, SPI

UNIT-II CAN
CAN - Architecture, Data transmission, Layers, Frame formats, applications

UNIT-III INTRODUCTION
PCIe - Revisions, Configuration space, Hardware protocols, applications

UNIT-IV USB
USB - Transfer types, enumeration, Descriptor types and contents, Device driver

UNIT-V PROTOCOLS
Data Streaming Serial Communication Protocol - Serial Front Panel Data Port (SFPDP) using fiber optic and copper cable

TEXT BOOKS:

1. Jan Axelson, “Serial Port Complete - COM Ports, USB Virtual Com Ports, and Ports for Embedded Systems”, Lakeview Research, 2nd Edition
2. Jan Axelson, “USB Complete”, Penram Publications
3. Mike Jackson, Ravi Budruk, “PCI Express Technology”, Mindshare Press

REFERENCE BOOKS:

1. Wilfried Voss, “A Comprehensible Guide to Controller Area Network”, Copperhill Media Corporation, 2nd Edition, 2005.
2. .Serial Front Panel Draft Standard VITA 17.1 –200x

e-Resources and Digital Material:

1. http://www.pcisig.com/www.pcisig.com, http://www.usb.org/www.usb.org

COURSE OUTCOMES:

1. Select a particular serial bus suitable for a particular application.
2. Develop APIs for configuration, reading and writing data onto serial bus.
3. Design and develop peripherals that can be interfaced to desired serial bus.

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

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4. Analyze and evaluate advanced high-speed serial communication standards such as CAN, PCIe, USB, and SFPDP for real-time embedded system applications.
5. Develop and troubleshoot device drivers and data-streaming interfaces for efficient and reliable communication over modern serial bus architectures.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58103A) ADVANCED COMPUTER ARCHITECTURE

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I FUNDAMENTALS OF COMPUTER DESIGN

Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, quantitative principles of computer design, Amdahl's law. Instruction set principles and examples- Introduction, classifying instruction set- memory addressing-type and size of operands, operations in the instruction set.

UNIT-II PIPELINES& MEMORY HIERARCHY DESIGN

Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe line for RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties. Memory Hierarchy Design: Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT-III INSTRUCTION LEVEL PARALLELISM THE HARDWARE APPROACH& ILP SOFTWARE APPROACH

Instruction Level Parallelism the Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation. ILP Software Approach: Basic compiler level techniques, static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

UNIT-IV MULTI PROCESSORS AND THREAD LEVEL PARALLELISM

Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization.

UNIT-V INTER CONNECTION AND NETWORKS

Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters. Intel Architecture: Intel IA- 64 ILP in embedded and mobile markets Fallacies and pit falls

TEXT BOOKS:

1. John L. Hennessy, David A. Patterson, "Computer Architecture: A Quantitative Approach", 3rd Edition, Elsevier.

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

REFERENCE BOOKS:

1. John P. Shen and Miikko H. Lipasti, “Modern Processor Design: Fundamentals of Super Scalar Processors”, 2002, Beta Edition, McGraw-Hill
2. Kai Hwang, Faye A.Brigs., “Computer Architecture and Parallel Processing”, Mc Graw Hill.
3. DezsoSima, Terence Fountain, Peter Kacsuk, “Advanced Computer Architecture - A Design Space Approach”, Pearson Education.

e-Resources and Digital Material:

1. Advanced Computer Architecture - BEC001 - KTU - Studocu

COURSE OUTCOMES:

1. Familiarize the instruction set, memory addressing of Computer
2. Handle the issues in pipelining and parallelism
3. Familiarize the practical issues in inter network
4. Analyze multiprocessor architectures and thread-level parallelism for high-performance computing.
5. Evaluate interconnection networks and cluster architectures for scalable computing systems.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D55104C) EMBEDDED SYSTEMS FOR AUTOMOBILE APPLICATIONS

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I ELECTRONICS IN AUTOMOTIVE

Introduction Body and convenience electronics: vehicle power supply controllers and lighting modules, door control modules, Safety electronics: active safety systems: ABS, ASR, ESP passive safety systems: Restraint systems and their associated sensors in an automobile.

UNIT-II POWER TRAIN ELECTRONICS

Gasoline engine management, Infotainment electronics: Dashboard/instrument cluster, car audio, telematic systems, navigation systems, multimedia systems, cross application technologies. 42V vehicle power supply system.

UNIT-III DRIVE BY WIRE

Challenges and opportunities of X-by-wire: system & design requirements steer-by-wire, brake-by-wire, suspension-by-wire, gas by-wire, power-by wire, shift by-wire. Future of Automotive Electronics.

UNIT-IV HARDWARE MODULES

MC9S12XD family features-Modes of operation-functional block diagram overview-programming model. Memory Map Overview Pulse Width Modulator (PWM)-On-chip ADC Serial Communication Protocol: SCI, SPI,IIC, CAN

UNIT-V SOFTWARE DEVELOPMENT TOOLS

Introduction to HCS12XDT512 Student Learning Kit & PBMCU (Project Board), Introduction to Code Warrior IDE-Editing Debugging-Simulating simple programs. Flashing code into HCS12XDT512 SLK board and testing. Integration of Software and Hardware-Downloading the Software from Host Machine to Target Machine.

TEXT BOOKS:

1. Werner Klingenstein; Semiconductors-Technical Information Technologies and characteristic data Publicis Corporate Publishing, 2 ndrevised edition 2004.
2. Ronald K Jurgen, Automotive Electronics Handbook; McGraw Hill, 2nd edition 1999.

REFERENCE BOOKS:

1. Werner Klingenstein & Team, Technical Information, Technologies and Characteristic Data- Publicis Corporate Publishing 2nd edition 2004.
2. LjuboVlacic, Michel Parent &Furnio Harshima, Intelligent Vehicle Technologies: Theory and Applications Butterworth-Heinemann publications200.

e-Resources and Digital Material:

1. https://www.vturesource.com/vtu-m-tech-yllabus/MAU/2020/3/20MAU321

COURSE OUTCOMES:

1. Explain basics of Automotive Embedded system concepts
2. Understanding the system and design requirements
3. Select embedded system in automobiles
4. Use hardware and usage software in Automotive Embedded System
5. Use different software development tools

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

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M.Tech. I Sem.

L	T	P	C
2	0	0	2

(25D55105) EMBEDDED SYSTEM DESIGN LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

PART A

Using Embedded C

Note: Any 6 Programs form the following

1. Write a simple program to print "hello world"

2. Write a simple program to show a delay.

3. Write a loop application to copy values from P1 to P2

4. Write a c program for counting the no of times that a switch is pressed & released.

5. Use of port header file (port M) using an interface consisting of a keypad and liquid crystal display.

6. Write a program to create a portable hardware delay.

7. Write a c program to test loop time outs.

8. Write a c program to test hardware-based timeout loops.

9. Develop a simple EOS showing traffic light sequencing.

Write a program to display elapsed time over RS-232 link

PART B

Note. Any 6 Programs from the following (Experiment 1 is Mandatory)

1. A Study of Code Composer Studio (CC Studio Latest Version)

2. Flashing a light by a software delay.

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3. Displaying Characters on LCD.

4. Serial Communication using UART.

5. Basic Input and Output using MSP430 UART.

6. Interrupt Handling using MSP430.

7. Analog to Digital Conversion using MSP430.

8. Interfacing external Devices to GPIO Ports

Equipment Required:

1. Computer with latest configurations

2. Code Composer Studio v6.1 (Preferably Latest version)

3. MSP430/ARM based Hardware kits and add-on boards

COURSE OUTCOMES:

1. Familiarize with embedded systems programming concepts
2. Implement different embedded communication and interfacing protocols

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									

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M.Tech. I Sem.

L	T	P	C
0	0	4	2

(25D55106) EMBEDDED PROGRAMMING LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

LIST OF EXPERIMENTS

Embedded C programming and testing using 8051 advanced development board and KEIL tools.

Program to perform

i. Arithmetic operations.

ii. Sorting of numbers.

a. Program to shift LEDs Left and right.

b. Program for DIP switch interface.

c. Program to display message in LCD 8-bit mode.

d. Program to display picture in GLCD 128X64.

e. Program to send data serially through serial port.

f. Program to display I2C RTC(DS1307) to Hyper terminal window.

g. Program to display digital temperature sensor output.

h. Program for 4X4 matrix keyboard with LCD.

i. Program to interface stepper motor.

j. Program to interface relay.

Embedded C programming and testing using LPC2148 development kit (Real time environment)

1. Program to interface LED and implement multi-tasking.

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2. Program to display RTC-ADC on LCD.

Program to display message on GLCD Software Requirements: Keil for C51, Keil for ARM Hardware Requirements: 8051 Development boards, LPC2148 Development boards.

COURSE OUTCOMES:

1. Understand the concepts of Embedded C programming
2. Implement given program on 8051 microcontrollers
3. Implement given program on LPC2148 microcontroller

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									

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L	T	P	C
2	0	0	2

(25D57107) RESEARCH METHODOLOGY AND IPR

Course Category	**Mandatory Course (credit)**
Course Enrichment Relevance	**Professional Ethics**

COURSE OBJECTIVES:

UNIT-I FUNDAMENTALS OF RESEARCH METHODOLOGY

Overview of research process and design - Types of Research - Approaches to Research (Qualitative vs Quantitative) - Observation studies, Experiments and Surveys - Use of Secondary and exploratory data to answer the research question - Importance of Reasoning in Research and Research ethics - Documentation Styles (APA/IEEE etc.) - Plagiarism and its consequences

UNIT-II DATA COLLECTION AND SOURCES

Importance of Data Collection - Types of Data - Data Collection Methods - Data Sources - primary, secondary and Big Data sources - Data Quality & Ethics - Tools and Technology for Data Collection

UNIT-III DATA ANALYSIS AND REPORTING

Overview of Multivariate analysis - Experimental research, cause-effect relationship, and development of hypotheses- Measurement systems analysis, error propagation, and validity of experiments - Guidelines for writing abstracts, introductions, methodologies, results, and discussions - Writing Research Papers & proposals

UNIT-IV UNDERSTANDING INTELLECTUAL PROPERTY RIGHTS

Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance

UNIT-V PATENTS

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification - Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licenses, Licensing of related patents, patent agents, Registration of patent agents

TEXT BOOKS:

1. 1.Stuart Melville and Wayne Goddard, Research Methodology: An introduction for Science & Engineering students, Juta and Company Ltd, 2004
2. 2.Catherine J. Holland, Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets, Entrepreneur Press, 2007.

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REFERENCE BOOKS:

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education 11e (2012). 2. Ranjit Kumar , Resea
2. Ranjit Kumar , Research Methodology: A Step-by-Step Guide for Beginners. . David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.
3. Deborah E. Bouchoux , Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets, 6th Edition, Cengage 2024
4. Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, The Craft of Research, 5th Edition, University of Chicago Press, 2024
5. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.
6. Peter Elbow, Writing With Power, Oxford University Press, 1998.

e-Resources and Digital Material:

1. Coursera / edX – Research Methodology and Data Analysis courses
2. Springer Link & ScienceDirect – Latest journals on research design and statistics
3. Google Scholar – Free access to research papers
4. NCBI Bookshelf – Open-access research methodology resources
5. Khan Academy (Statistics & Probability) – For fundamentals of hypothesis testing, regression, and ANOVA.

COURSE OUTCOMES:

1. Recall key concepts and terminology related to research design, data collection, and intellectual property rights.
2. Explain the importance of research design and data analysis in research studies, and describe the concept of intellectual property rights.
3. Design a research study, including data collection and analysis methods, and apply intellectual property rights principles to protect research findings.
4. Analyze research studies to identify strengths and limitations, and evaluate the effectiveness of data collection and analysis methods.
5. Assess the impact of intellectual property rights on research and innovation, and evaluate the effectiveness of research designs and methods.
6. Develop a comprehensive research plan, including a detailed research design, data collection and analysis methods, and a plan for protecting intellectual property.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									

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CO5									
CO6									

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M.Tech. I Sem.

L	T	P	C
0	1	2	2

(25D55107) EMBEDDED LINUX

Course Category	**Skill Oriented Course (SC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

COURSE OUTCOMES:

1. Midterm short answers, quizzes, lecture-based assignments.
2. Lab assignments (Buildroot/Yocto exercise), a submitted cross-build (rootfs + app).
3. Driver implementation lab + demo; graded by functionality, code quality, documentation.
4. Debugging lab tasks with logs and a written troubleshooting report.
5. Mini-project showing real-time behavior and system-level integration.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
2	0	0	0

(25D57109A) ENGLISH FOR RESEARCH PAPER WRITING

Course Category	**Mandatory Course (Non-credit)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Understand the essentials of writing skills and their level of readability
2. Learn about what to write in each section
3. Ensure qualitative presentation with linguistic accuracy

UNIT-I OVERVIEW OF A RESEARCH PAPER

Overview of a Research Paper- Planning and Preparation- Word Order- Useful Phrases - Breaking up Long Sentences-Structuring Paragraphs and Sentences-Being Concise and Removing Redundancy -Avoiding Ambiguity

UNIT-II ESSENTIAL COMPONENTS OF A RESEARCH PAPER

Essential Components of a Research Paper- Abstracts- Building Hypothesis-Research Problem - Highlight Findings- Hedging and Criticizing, Paraphrasing and Plagiarism, Cauterization

UNIT-III INTRODUCING REVIEW OF THE LITERATURE

Introducing Review of the Literature? Methodology - Analysis of the Data-Findings - Discussion-Conclusions-Recommendations.

UNIT-IV SKILLS FOR WRITING PAPER

Key skills needed for writing a Title, Abstract, and Introduction.

UNIT-V APPROPRIATE LANGUAGE TO FORMULATE METHODOLOGY

Appropriate language to formulate Methodology, incorporate Results, put forth Arguments and draw Conclusions.

TEXT BOOKS:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I]
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman‟sbook
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

COURSE OUTCOMES:

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

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1. Understand the significance of writing skills and the level of readability
2. Analyze and write title, abstract, different sections in research paper
3. Develop the skills needed while writing a research paper

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									

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DEPARTMENT OF ECE - EMBEDDED SYSTEMS

M.Tech. I Sem.

L	T	P	C
2	0	0	0

(25D57109C) DISASTER MANAGEMENT

Course Category	**Mandatory Course (Non-credit)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. Learn to demonstrate critical understanding of key concepts in disaster risk reduction and humanitarian response
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from Multiple perspectives
3. Develop and understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations
4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

UNIT-I INTRODUCTION & DISASTER PRONE AREAS IN INDIA

Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Naturaland Manmade Disasters: Difference, Nature, Types and Magnitude.
Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post- Disaster Diseases and Epidemics

UNIT-II REPERCUSSIONS OF DISASTERS AND HAZARDS

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdow

UNIT-III DISASTER PREPAREDNESS AND MANAGEMENT

Preparedness: Monitoring of Phenomena Triggering, A Disasteror Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness

UNIT-IV RISK ASSESSMENT DISASTER RISK

Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People? Participation in Risk Assessment. Strategies for Survival.

UNIT-V DISASTER MITIGATION

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India

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TEXT BOOKS:

1. R. Nishith, SinghAK, Disaster Management in India: Perspectives, issues and strategies
2. New Royal book Company. Sahni, PardeepEt.Al. (Eds.), Disaster Mitigation Experiences And Reflections, Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text And Case Studies, Deep & Deep Publication Pvt. Ltd., New Delhi.

COURSE OUTCOMES:

1. Students will be able to define and differentiate between hazards and disasters, understand their causes, types, and magnitudes, and recognize disaster-prone areas in India.
2. Learners will be able to assess the economic, environmental, and social repercussions of both natural and man-made disasters, including their effects on ecosystems and human/animal life.
3. Students will gain knowledge on disaster preparedness techniques, including monitoring, risk evaluation, and the use of technologies such as remote sensing and meteorological data for early warning and management
4. Learners will be equipped to analyze disaster risk components, apply risk assessment methodologies, and understand global and national efforts toward disaster risk reduction with community participation.
5. Students will be able to design and apply structural and non-structural mitigation measures, understand ongoing mitigation programs in India, and propose effective strategies for sustainable disaster management.

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									

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VISION

- To become a nucleus for pursuing technical education and pool industrial research and developmental activities with social-conscious and global standards.

MISSION

M1: To provide Advanced Educational Programs and prepare students to achieve success and take leading roles in their chosen fields of specialization by arising a self-sustained University.

M2: To establish postgraduate programs in the current and Advanced Technologies.

M3: To establish an R&D Consultancy through developing Industry Institute Interaction, building up exceptional infrastructure.

M4: To propel every individual, realize and act for the technical development of the society.

MOTTO

- Education for Peace and Progress

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+91 9866308475