www.srecnandyal.edu.in

REGULATIONS: R-25

Santhiram Engineering College (Autonomous)

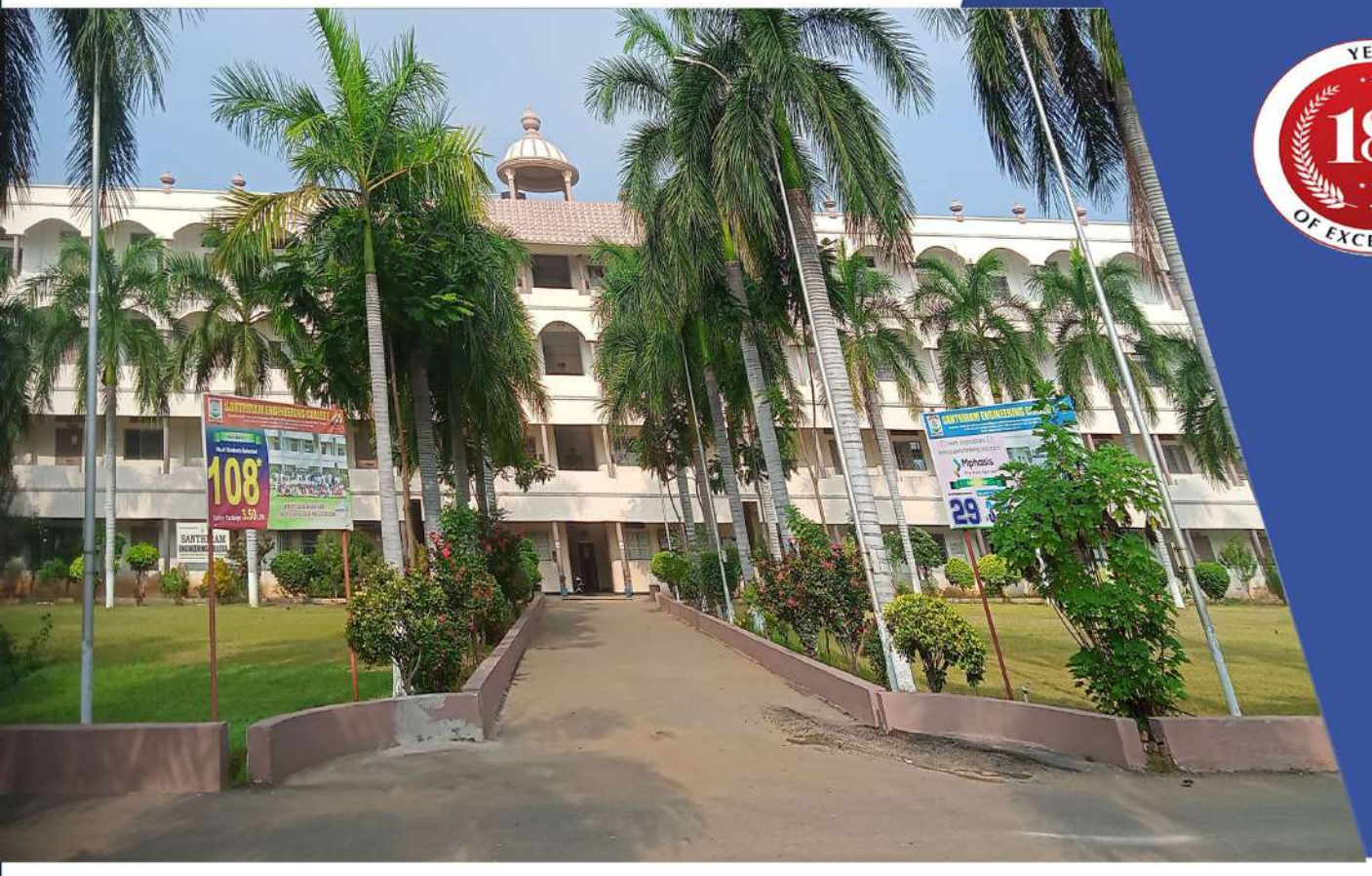
Approved by A.I.C.T.E., New Delhi, Permanently Affiliated to JNT University, Ananthapuramu
Accredited by NAAC with Grade-A, Accredited by NBA (ECE & CSE)
An ISO 9001:2015 Certified Institution,2(f) &12(B) recognition by UGC Act, 1956
NH-40, NANDYAL-518501 (Dist), A.P.

ACCADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABI

M.TECH (COMPUTER SCIENCE & ENGINEERING)

(Applicable for the Admitted Batch 2025-26)

Learn-Grow-Empower



YEAR 18th OF EXCELLENCE

+91 9866308475

EAPCET/ICET/ECET/PGCET
Counselling Code: SREC

17 Years of Excellence

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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SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech
I-Semester Course Structure

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

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	25D58101	PC	ADVANCED DATA STRUCTURES & ALGORITHMS	3	0	0	3	40	60	100
2	25D58102	PC	DISTRIBUTED OPERATING SYSTEMS	3	0	0	3	40	60	100
3	25D58103A	PE	ADVANCED COMPUTER ARCHITECTURE (PE-I)	3	0	0	3	40	60	100
4	25D58103B	PE	ENTERPRISE CLOUD CONCEPTS (PE-I)	3	0	0	3	40	60	100
5	25D58103C	PE	APPLIED MACHINE LEARNING (PE-I)	3	0	0	3	40	60	100
6	25D58103D	PE	PARALLEL COMPUTER ARCHITECTURE (PE-I)	3	0	0	3	40	60	100
7	25D58103E	PE	ARTIFICIAL INTELLIGENCE: KNOWLEDGE REPRESENTATION AND REASONING (PE-I)	3	0	0	3	40	60	100
8	25D58104A	PE	NATURAL LANGUAGE PROCESSING (PE-II)	3	0	0	3	40	60	100
9	25D58104B	PE	SMART SENSOR NETWORKS &IOT (PE-II)	3	0	0	3	40	60	100
10	25D58104C	PE	COMPUTING FOR DATA ANALYTICS (PE-II)	3	0	0	3	40	60	100
11	25D58104E	PE	CRYPTOGRAPHY AND NETWORKS SECURITY (PE-II)	3	0	0	3	40	60	100
12	25D58105	PC	ADVANCED DATA STRUCTURES & ALGORITHMS LAB	0	0	4	2	40	60	100
13	25D58106	PC	DISTRIBUTED OPERATING SYSTEMS LAB	0	0	4	2	40	60	100
14	25D57107	MC(C)	RESEARCH METHODOLOGY AND IPR	2	0	0	2	40	60	100
15	25D58107	SC	FULL STACK DEVELOPMENT USING MERN	0	1	2	2	40	60	100
16	25D57109A	MC(NC)	ENGLISH FOR RESEARCH PAPER WRITING (AC-I)	2	0	0	0	40	0	40

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

17	25D57109C	MC(NC)	DISASTER MANAGEMENT (AC-I)	2	0	0	0	40	0	40
18	25D57109D	MC(NC)	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (AC-I)	2	0	0	0	40	0	40

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech
I -Semester Syllabus

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58101) ADVANCED DATA STRUCTURES & ALGORITHMS

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

COURSE OBJECTIVES:

UNIT-I INTRODUCTION

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular ListsAlgorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT-II SEARCHING AND SORTING

:

Linear and Binary Search Methods, Sorting: -Basic sorting techniques, Radix Sort, Bucket Sort, Shell Sort Trees- Binary trees, Properties, Representation and Traversals, Expression Trees (Infix, prefix, postfix). Graphs-Basic Concepts, Storage structures and Traversals.

UNIT-III DICTIONARIES AND HASHING

Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries. Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing

UNIT-IV PRIORITY QUEUES

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

UNIT-V SEARCH TREES

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Data Structures and Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2. Data Structures and Algorithms, 3/e, Adam Drozdek, Cengage

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

COURSE OUTCOMES:

1. Implement and manipulate linear data structures like singly/doubly linked lists, circular lists, stacks, and queues using dynamic memory allocation.
2. Apply and analyze searching and sorting algorithms including linear, binary search, bubble, selection, insertion, quick, and merge sort.
3. Design and implement dictionaries and hashing techniques to efficiently store and retrieve data.
4. Construct and operate on trees and priority queues, performing insertion, deletion, and traversal operations.
5. Compare and implement balanced search trees (AVL, Red-Black, Splay, B-Trees) for optimized data access and storage.

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 CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem. L T P C

(25D58201) ADVANCES IN SOFTWARE ENGINEERING

Course Category	
Course Enrichment Relevance	

COURSE OBJECTIVES:

COURSE OUTCOMES:

Mapping COs with POs & PSOs:

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

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58102) DISTRIBUTED OPERATING SYSTEMS

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

COURSE OBJECTIVES:

1. Introduce the architectures, principles, and design issues of distributed, database, and multiprocessor operating systems.
2. Develop an understanding of communication, synchronization, deadlock handling, and agreement protocols in distributed environments.
3. Explain distributed resource management, shared memory, scheduling, and fault tolerance techniques
4. Provide knowledge of security and protection models, and cryptographic methods for secure distributed computing.
5. Explore the structure and design issues of multiprocessor and database operating systems with concurrency control mechanisms.

UNIT-I UNIT I

Architectures of Distributed Systems, System Architecture types, issues in distributed operatingsystems,communicationnetworks,communicationprimitives.TheoreticalFoundations,inherentlimitations of a distributed system, lamp ports logical clocks, vector clocks, casual ordering of messages,global state, cutsof adistributed computation, termination detection.

UNIT-II UNIT – II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, Non-Token – Based Algorithms: Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm, Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal'sHeurisric Algorithm, Raymond's Heuristic Algorithm.

UNIT-III UNIT – III

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

UNIT-IV UNIT – IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling. Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

UNIT-V UNIT V

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOKS:

1. Advancedconceptsinoperatingsystems:Distributed,Databaseandmultiprocessoroperating systems",MukeshSinghal, Niranjan andG.Shivaratri,TMH, 2001
2. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles and Paradigms, Pearson Education, 2nd Edition, 2006.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles and Paradigms, Pearson Education, 2nd Edition, 2006. 2. 3. 4. 5. 6.
2. Silberschatz, Galvin, Gagne, Operating System Concepts, Wiley, 9th Edition, 2018.
3. M. Mitzenmacher, E. Upfal, Probability and Computing: Randomized Algorithms and Probabilistic Analysis, Cambridge University Press, 2005.
4. Alan Tucker, Applied Combinatorics, John Wiley & Sons, 5th Edition, 2007.
6. George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, Distributed Systems: Concepts and Design, Pearson, 5th Edition, 2011.

e-Resources and Digital Material:

COURSE OUTCOMES:

1. Explain the architectures, limitations, and synchronization mechanisms (logical clocks, mutual exclusion) in distributed systems.
2. Analyze distributed deadlock detection methods, agreement protocols, and distributed resource management techniques
3. Apply concepts of distributed shared memory, scheduling, and fault-tolerance techniques for reliable system design.
4. Evaluate models of protection, access control, and cryptographic algorithms for ensuring data security in distributed systems
5. Compare multiprocessor and database operating systems, and analyze concurrency control algorithms for distributed databases.

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 CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58103A) ADVANCED COMPUTER ARCHITECTURE (PE-I)

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

COURSE OBJECTIVES:

1. To impart the concepts and principles of parallel and advanced computer architectures.
2. To develop the design techniques of Scalable and multithreaded Architectures.
3. To apply the concepts and techniques of parallel and advanced computer architectures to design modern computer systems

UNIT-I MICRO PROCESSORS

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multi computers, Multi vector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

UNIT-II PARALLEL PROCESSING

Principles of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors

UNIT-III PIPELINE PROCESSORS

Shared-Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

UNIT-IV ARCHITECTURE OF MICROPROCESSORS

Parallel and Scalable Architectures, Multiprocessors and Multi computers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multi computers, Message-passing Mechanisms, Multi vector and SIMD computers.

UNIT-V APPLICATIONS

Vector Processing Principles, Multi vector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-5.

TEXT BOOKS:

1. Advanced Computer Architecture, Kai Hwang, 2nd Edition, Tata McGraw Hill Publishers.

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

REFERENCE BOOKS:

1. Computer Architecture, J.L. Hennessy and D.A. Patterson, 4th Edition, ELSEVIER.
2. Advanced Computer Architectures, S.G.Shiva, Special Indian edition, CRC, Taylor &Francis.
3. Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G.Wellein, CRC Press, Taylor & Francis Group.
4. Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education.
5. Computer Architecture, B. Parhami, Oxford Univ. Press.

COURSE OUTCOMES:

1. Analyze various parallel computer models, program partitioning techniques, and system interconnect architectures to evaluate conditions for parallelism.
2. Apply performance metrics and scalability analysis to assess parallel processing applications using advanced processor and memory technologies
3. Design and differentiate linear, non-linear, instruction, and arithmetic pipelines to enhance execution performance in modern processors.
4. Examine multiprocessor and multicomputer architectures, cache coherence protocols, and synchronization mechanisms for scalable system design.
5. Design and differentiate linear, non-linear, instruction, and arithmetic pipelines to enhance execution performance in modern processors.

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 CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58103B) ENTERPRISE CLOUD CONCEPTS (PE-I)

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

COURSE OBJECTIVES:

1. Knowledge on significance of cloud computing and its fundamental concepts and models.

UNIT-I UNIT 1

and Challenges. Fundamental Concepts and Models: Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models.

UNIT-II UNIT II

Cloud-Enabling Technology: Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology CLOUD COMPUTING MECHANISMS: Cloud Infrastructure Mechanisms: Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud Usage Monitor, Resource Replication

UNIT-III UNIT III

Cloud Management Mechanisms: Remote Administration System, Resource Management System, SLA Management System, Billing Management System, Case Study Example
Cloud Computing Architecture Fundamental Cloud Architectures: Workload Distribution Architecture, Resource Pooling Architecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load Balancing Architecture, Cloud Bursting Architecture, Elastic Disk Provisioning Architecture, Redundant Storage Architecture, Case Study Example

UNIT-IV UNIT IV

Cloud-Enabled Smart Enterprises Introduction, Revisiting the Enterprise Journey, Service-Oriented Enterprises, Cloud Enterprises, Smart Enterprises, The Enabling Mechanisms of Smart Enterprises Cloud-Inspired Enterprise Transformations Introduction, The Cloud Scheme for Enterprise Success, Elucidating the Evolving Cloud Idea, Implications of the Cloud on Enterprise Strategy, Establishing a Cloud-Incorporated Business Strategy

UNIT-V UNIT V

Transitioning to Cloud-Centric Enterprises The Tuning Methodology, Contract Management in the Cloud Cloud Instigated IT Transformations Introduction, Explaining Cloud Infrastructures, A Briefing on Next-Generation Services, Service Infrastructures, Cloud Infrastructures, Cloud Infrastructure Solutions, Clouds for Business Continuity, The Relevance of Private Clouds, The Emergence of Enterprise Clouds

TEXT BOOKS:

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

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1. Erl Thomas, Puttini Ricardo, Mahmood Zaigham, Cloud Computing: Concepts, Technology & Architecture 1st Edition.
2. Pethuru Raj, Cloud Enterprise Architecture, CRC Press

REFERENCE BOOKS:

1. Pethuru Raj, Cloud Enterprise Architecture, CRC Press

COURSE OUTCOMES:

1. Understand importance of cloud architecture
2. Illustrating the fundamental concepts of cloud security
3. Analyze various cloud computing mechanisms
4. Understanding the architecture and working of cloud computing.

Mapping COs with POs & PSOs:

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

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58103C) APPLIED MACHINE LEARNING (PE-I)

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

COURSE OBJECTIVES:

1. To know the fundamental concepts of Machine Learning.
2. To understand linear, distance based, and decision tree based models
3. To explore tools and practices for Machine learning in Real world situation.
4. To know the Artificial Neural Network and Reinforcement Learning.

UNIT-I UNIT I

Introduction to Machine Learning: Introduction. Different types of learning, Examples of Machine Learning Applications Supervised Learning: Learning a Class from Examples, Probably Approximately Correct Learning, Learning multiple classes, Model selection and generalization Regression: Linear regression, Multiple Linear regression, Logistic Regression.

UNIT-II UNIT II

The ingredients of machine learning: Tasks, Models, Features Binary classification and related tasks: Classification, Assessing classification performance, Visualizing classification performance Beyond binary classification: Multi-class classification, Regression, Unsupervised and descriptive learning

UNIT-III UNIT III

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Inductive bias in decision tree, Issues in decision tree learning. Linear models: The least-squares method, Multivariate linear regression, The perceptron, Support vector machines, Soft margin SVM, Going beyond linearity with kernel methods.

UNIT-IV UNIT IV

Distance Based Models: Introduction, Neighbours and exemplars, Nearest Neighbours classification, K-Means algorithms, Clustering around medoids Probabilistic Models: Using Naïve Bayes Model for classification, Expectation Maximization, Gaussian Mixture models

UNIT-V UNIT V

Artificial Neural Networks: Introduction, Neural network representation, appropriate problems for neural network learning, Multilayer networks and the back propagation, Advanced topics in Artificial Neural Networks Reinforcement Learning: Introduction, Learning tasks, Q-learning

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

TEXT BOOKS:

1. Machine Learning: The art and Science of algorithms that make sense of data, Peter Flach, Cambridge University Press, 2012
2. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education

REFERENCE BOOKS:

1. AurélienGéron, Hands-On Machine Learning with Scikit-Learn, Keras, and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems 2nd Edition
2. Stephen Marsland, “Machine Learning – An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014
3. EthemAlpaydın, Introduction to machine learning, second edition, MIT press.
4. T. Hastie, R. Tibshirani and J. Friedman, “Elements of Statistical Learning”, Springer Series, 2nd edition

COURSE OUTCOMES:

1. Understand the fundamental concepts of machine learning
2. Apply linear, distance based, and decision tree based models
3. Analyze probabilistic, neural network models
4. Design a suitable machine learning model for a given scenario

Mapping COs with POs & PSOs:

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

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58103D) PARALLEL COMPUTER ARCHITECTURE (PE-I)

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

COURSE OBJECTIVES:

1. Understand Parallel Architectures: Learn the fundamentals of parallel computer architectures, including shared-memory and distributed-memory systems.
2. Explore Parallel Programming Models: Study different programming models and architectural approaches for efficient parallel computation.
3. Analyze Memory Hierarchy and Coherence: Examine cache design, memory hierarchy, cache coherence protocols (MSI, MESI, Dragon), and correctness of coherence mechanisms.
4. Study Scalable Shared Memory and Consistency Models: Understand scalable coherence protocols, NUMA architectures, and memory consistency models (sequential and relaxed).
5. Learn Synchronization and Interconnection Mechanisms: Explore synchronization techniques (LL-SC, barriers) and interconnection network.

UNIT-I INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND SYMBOLIC REASONING

Introduction to Parallel Architectures, Parallel Programming models and Architectures, Memory Hierarchy-Cache and Virtual memory.

UNIT-II PROPOSITIONAL AND FIRST-ORDER LOGIC

Overview of Cache coherence, Coherence Protocols- Snooping, Directory based protocols, VI protocol MSI, MESI, Dragon protocol and Correctness of coherence protocols- Types of cache misses, update vs invalidate protocol.

UNIT-III INFERENCE MECHANISMS AND LOGIC PROGRAMMING

Snoop based multiprocessor design, Single and multi-level cache with atomic bus Snoop based multiprocessor design, Single and multi-level cache with split transaction bus Scalable shared memory systems: Directory coherence protocols- Memory based, cache based, correctness.

UNIT-IV KNOWLEDGE REPRESENTATION TECHNIQUES

Case study: Origin- Architecture, protocol, correctness; Sequent NUMA Q- Architecture, protocol, correctness

UNIT-V ADVANCED REASONING AND EPISTEMIC LOGIC

Memory consistency models- Sequential, Relaxed consistency models, Synchronization- LL-SC, point to point, barrier synchronization, Interconnects- Introduction, Topologies, routing, flow control.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

TEXT BOOKS:

1. D. E. Culler and J. P. Singh with A. Gupta. Parallel Computer Architecture. Morgan- Kaufmann publishers.
2. J. L. Hennessy and D. A. Patterson. Computer Architecture: A Quantitative Approach. Morgan- Kaufmann publishers.
3. M. Dubois, M. Annavaram, Per Stenstrom. Parallel Computer Organisation and Design. Cambridge University Press.

REFERENCE BOOKS:

1. John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann.
2. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw Hill.
3. David E. Culler and Jaswinder Pal Singh, Parallel Computer Architecture: A Hardware/Software Approach, Morgan Kaufmann
4. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson.
5. Michael J. Quinn, Parallel Programming in C with MPI and OpenMP, McGraw Hill.

COURSE OUTCOMES:

1. Demonstrate knowledge of different parallel architectures, programming models, and their design principles.
2. Explain cache and virtual memory concepts, cache coherence mechanisms, and protocols such as MSI, MESI, and Dragon.
3. Compare snoop-based and directory-based coherence protocols in single and multi-level cache systems, and assess scalability in shared memory systems.
4. Understand and apply various memory consistency models (sequential and relaxed) and synchronization mechanisms like LL-SC, barriers, and point-to-point methods.
5. Analyze interconnection topologies, routing techniques, and flow control strategies for efficient communication in parallel systems.

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 CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58103E) ARTIFICIAL INTELLIGENCE: KNOWLEDGE REPRESENTATION AND REASONING (PE-I)

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

COURSE OBJECTIVES:

1. To understand the foundations, history, and philosophy of Artificial Intelligence and symbolic reasoning.
2. To learn propositional and first-order logic for formal knowledge representation and inference.
3. To study inference mechanisms and logic programming using Prolog and rule-based systems.
4. To explore various knowledge representation techniques like frames, semantic networks, and description logics.
5. To understand advanced reasoning approaches such as non-monotonic, temporal, and epistemic reasoning.

UNIT-I INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND SYMBOLIC REASONING

Introduction to AI, History, and Philosophy, Foundations of Knowledge Representation and
Reasoning, Symbolic Reasoning and Logic, Truth, Logic, and Provability, Syntax and Semantics of
Logic, Logical Entailment and Proof Systems.

UNIT-II INTRODUCTION TO AI, HISTORY, AND PHILOSOPHY, FOUNDATIONS OF KNOWLEDGE REPRESENTATION AND REASONING, SYMBOLIC REASONING AND LOGIC, TRUTH, LOGIC, AND PROVABILITY, SYNTAX AND SEMANTICS OF LOGIC, LOGICAL ENTAILMENT AND PROOF SYSTEMS.

Propositional Logic: Syntax, Semantics, and Direct Proofs, The Tableau Method for Satisfiability,
First-Order Logic (FOL): Syntax and Semantics, Quantifiers and Inference Rules, Universal
Instantiation and Generalization, The Unification Algorithm.

UNIT-III INFERENCE MECHANISMS AND LOGIC PROGRAMMING

Forward and Backward Chaining, The Resolution Refutation Method, Horn Clauses and Logic
Programming, The Prolog Language: Syntax and Semantics, Rule-Based Systems and the OPS5
Language, Pattern Matching and the RETE Algorithm.

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

UNIT-IV KNOWLEDGE REPRESENTATION TECHNIQUES

Representation in First-Order Logic, Conceptual Dependency Theory (Schank's Model), Frame
Based Knowledge Representation, Description Logics and the Web Ontology Language (OWL),
Taxonomies and Inheritance, Default Reasoning and Exceptions

UNIT-V ADVANCED REASONING AND EPISTEMIC LOGIC

Circumscription and Non-Monotonic Reasoning, Auto-epistemic Reasoning, Event Calculus and
Temporal Reasoning, Epistemic Logic: Knowledge and Belief, Modal Logic and Applications in
AI.

TEXT BOOKS:

1. Ronald J. Brachman & Hector J. Levesque (2004) — Knowledge Representation and Reasoning, Morgan Kaufmann.
2. Deepak Khemani (2013) — A First Course in Artificial Intelligence, McGraw Hill Education (India).

REFERENCE BOOKS:

1. Roger C. Schank & Robert P. Abelson — Scripts, Plans, Goals, and Understanding, Lawrence Erlbaum, 1977.
2. R. C. Schank & C. K. Riesbeck — Inside Computer Understanding: Five Programs Plus Miniatures, Lawrence Erlbaum, 1981.
3. Murray Shanahan — A Circumscriptive Calculus of Events, Artificial Intelligence, 77(2), 249- 284, 1995.
4. Grigoris Antoniou & Frank van Harmelen — A Semantic Web Primer (2nd Ed.), MIT Press, 2008.
5. John F. Sowa — Conceptual Structures: Information Processing in Mind and Machine, Addison–Wesley, 1984.

COURSE OUTCOMES:

1. Understand the fundamental concepts, history, and role of reasoning in Artificial Intelligence.
2. Apply propositional and first-order logic for knowledge representation and inference.
3. Implement inference mechanisms and logic programming techniques using Prolog and rule□based systems.
4. Analyze and design various knowledge representation models such as frames, ontologies, and semantic networks
5. Evaluate advanced reasoning techniques including non-monotonic, temporal, and epistemic reasoning for intelligent systems.

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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 CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58104A) NATURAL LANGUAGE PROCESSING (PE-II)

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

COURSE OBJECTIVES:

1. Introduce the fundamental concepts of human language, linguistic structures, and their computational representation for Natural Language Processing.
2. Develop knowledge of grammars, parsing strategies, semantic interpretation, and language modelling techniques for designing NLP systems.
3. Explore advanced NLP applications such as machine translation, multilingual information retrieval, and cross-lingual language processing.

UNIT-I UNIT I

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems,
Different Levels of Language Analysis, Representations and Understanding, Organization of
Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

UNIT-II UNIT-II

:
Grammars and Parsing- Top-Down and Bottom-Up Parsers, Transition Network Grammars, Feature
Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with
Features, Augmented Transition Networks, Bayes Rule, Shannon game, Entropy and Cross Entropy.

UNIT-III UNIT III

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in
Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in
Parsing, Shift Reduce Parsers, Deterministic Parsers

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UNIT-IV SEMANTIC INTERPRETATION &LANGUAGE MODELLING

Semantic Interpretation: Semantic & Logical form, Word senses & ambiguity, The basic logical
form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic
roles, Speech acts &embedded sentences, Defining semantics structure model theory.

Language Modelling: Introduction, n-Gram Models, Language model Evaluation, Parameter
Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modelling
Problems, Multilingual and Cross lingual Language Modelling

UNIT-V UNIT-V

Machine Translation Survey: Introduction, Problems of Machine Translation, Is Machine
Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language
Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System,
User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval: Introduction, Document Pre-processing, Monolingual
Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and
Resources.

TEXT BOOKS:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications: From Theory To Practice-Daniel M.Bikel and ImedZitouni, Pearson Publications.
3. Natural Language Processing, Apaninian perspective, AksharBharathi, Vineetchaitanya, Prentice–Hall of India.

REFERENCE BOOKS:

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993. 2. 3.
2. Jurafsky,Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

COURSE OUTCOMES:

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1. Understand linguistic foundations of English syntax and various levels of language analysis for Natural Language Processing. 2. 3. Analyse different grammar formalisms and parsing approaches to handle language phenomena like movement, ambiguity, and human preferences in parsing. 4.. 5.
2. Apply parsing techniques such as top-down, bottom-up, ATNs, and feature-based systems for grammatical analysis of natural language.
3. Analyse different grammar formalisms and parsing approaches to handle language phenomena like movement, ambiguity, and human preferences in parsin
4. Construct semantic representations using logical forms, thematic roles, and speech acts, and apply n-gram and statistical models for language modeling
5. Evaluate and compare machine translation approaches and demonstrate understanding of systems like Anusaraka for multilingual language processing.
6. Implement and analyze multilingual information retrieval systems, app

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									
CO6									

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

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3	0	0	3

(25D58104B) SMART SENSOR NETWORKS &IOT (PE-II)

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

COURSE OBJECTIVES:

1. To provide an in-depth understanding of IoT concepts, applications, and research areas in domains such as smart cities, smart health, smart energy, and smart transportation.
2. To analyzeIoT system architectures, design constraints, physical devices, communication protocols, and middleware for advanced implementation
3. To explore industrial and commercial IoT applications, including automation, sensor networks, and emerging trends like edge computing, cloud of things, and digital twins

UNIT-I INTRODUCTION AND APPLICATIONS

:

smart transportation, smart cities, smart living, smart energy,
smart health, and smart learning. Examples of research areas include for instance: Self-Adaptive
Systems, Cyber Physical Systems, Systems of Systems, Software Architectures and Connectors,
Software Interoperability, Big Data and Big Data Mining, Privacy and Security IoT Reference
Architecture Introduction, Functional View, Information View, Deployment and Operational View,
Other Relevant architectural views.

UNIT-II REAL-WORLD DESIGN CONSTRAINTS-

Introduction, Technical Design constraints, hardware, Data
representation and visualization, Interaction and remote control.

UNIT-III IOT PHYSICAL DEVICES & ENDPOINTS

:

What is an IOT Device, Exemplary Device Board, Linux on
Raspberry, Interface and Programming & IOT Device. Hardware Platforms and Energy Consumption, Operating Systems, Time Synchronization, Positioning and Localization, Medium
Access Control, Topology and Coverage Control, **Routing:** Transport Protocols, Network Security,
Middleware, Databases

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UNIT-IV UNIT IV

Industrial Automation-Service-oriented architecture-based device integration, SOCRADES:
realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the
Cloud of Things, Commercial Building Automation-Introduction,

UNIT-V UNIT V

Case study: phase one-commercial building automation today.
Case study: phase two commercial building automation in the future. Recent trends in sensor
network and IOT architecture, Automation in Industrial aspect of IOT.

TEXT BOOKS:

1. Mandler, B., Barja, J., MitreCampista, M.E., Cagáová, D., Chaouchi, H., Zeadally, S., Badra, M., Giordano, S., Fazio, M., Somov, A., Vieriu, R.-L., Internet of Things. IoT Infrastructures, Springer International Publication
2. Internet of Things: A Hands-On Approach Paperback – 2015, by ArsheepBahga (Author), Vijay Madisetti (Author) or), Barton Rob (Author)
3. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things by Pearson Paperback – 16 Aug 2017 ,by Hanes David (Author), Salgueiro Gonzalo (Author), Grossetete Patrick (Auth

REFERENCE BOOKS:

COURSE OUTCOMES:

1. Explain the fundamental concepts, applications, and research areas of IoT across various domains.
2. AnalyzeIoT reference architectures, functional and deployment views, and real-world design constraints including hardware, technical, and operational limitations.
3. Demonstrate practical knowledge of IoT devices, programming, operating systems, communication protocols, network security, and database management.
4. Apply IoT principles to industrial automation and enterprise integration using frameworks such as SOCRADES and IMC-AESOP.
5. Evaluate case studies in commercial building automation and emerging IoT trends, including edge/fog computing, predictive maintenance, and digital twin technologies.

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 CSE - COMPUTER SCIENCE ENGINEERING

CO4									
CO5									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
3	0	0	3

(25D58104C) COMPUTING FOR DATA ANALYTICS (PE-II)

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

COURSE OBJECTIVES:

1. Provide knowledge of the data analytics lifecycle, including business understanding, data science roles, and project deliverables.
2. Develop a strong foundation in statistical methods, probability, and hypothesis testing for data-driven decision-making
3. Equip students with skills to apply predictive analytics, regression, time series forecasting, and experimental design techniques to real-world datasets.

UNIT-I DATA ANALYTICS LIFE CYCLE

Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists
- Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables
for stakeholders.

UNIT-II STATISTICS

Sampling Techniques - Data classification, Tabulation, Frequency and Graphic representation -
Measures of central value - Arithmetic mean, Geometric mean, Harmonic mean, Mode, Median,
Quartiles, Deciles, Percentile - Measures of variation – Range, IQR, Quartile deviation, Mean
deviation, standard deviation, coefficient variance, skewness, Moments & Kurtosis.

UNIT-III PROBABILITY AND HYPOTHESIS TESTING

Random variable, distributions, joint probability function, marginal density function. Random
vectors - Some special probability distribution - Binomial, Poison, Geometric, uniform, exponential,
normal, gamma and Erlang - Normal distribution.

UNIT-IV PREDICTIVE ANALYTICS

Sampling distribution – Estimation - point, confidence - Test of significance, 1& 2 tailed test, uses
of t-distribution, F-distribution, $\chi 2$ distribution - Predictive modeling and Analysis - Regression
Analysis, Correlation analysis, Rank correlation coefficient, Multiple correlation.

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UNIT-V TIME SERIES FORECASTING AND DESIGN OF EXPERIMENTS

Forecasting Models for Time series : MA, SES, TS with trend, season - Design of Experiments, one
way classification, two way classification, ANOVA, Latin square, Factorial Design.

TEXT BOOKS:

1. Chris Eaton, Dirk Deroos, Tom Deutsch et al., —Understanding Big Data, Mc Graw Hill, 2012.
2. Alberto Cordoba, —Understanding the Predictive Analytics Lifecycle, Wiley, 2014.
3. Eric Siegel, Thomas H. Davenport, —Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die, Wiley, 2013.

REFERENCE BOOKS:

1. James R Evans,—Business Analytics – Methods, Models and Decisions, Pearson 2013
2. R. N. Prasad, Seema Acharya, —Fundamentals of Business Analytics, Wiley, 2015
3. S M Ross, —Introduction to Probability and Statistics for Engineers and Scientists‖, Academic Foundation, 2011.
4. David Hand, HeikiMannila, Padhria Smyth, —Principles of Data Mining, PHI 2013
5. Spyros Makridakis, Steven C Wheelwright, Rob J Hyndman, —Forecasting methods and applications Wiley 2013(Reprint).
6. David Hand, HeikkiMannila, Padhraic Smyth, —Principles of Data mining, PHI 2013.

e-Resources and Digital Material:

COURSE OUTCOMES:

1. Understand the data analytics lifecycle and identify the roles and responsibilities of data scientists in business analytics projects.
2. Apply statistical techniques such as measures of central tendency, variation, skewness, and kurtosis for data summarization and interpretation.
3. Analyze probability distributions (binomial, Poisson, normal, exponential, gamma, etc.) and apply them in modeling uncertain events.
4. Perform hypothesis testing and predictive analytics using t-tests, chi-square tests, regression, correlation, and multiple correlation methods.
5. Design forecasting models (moving average, exponential smoothing, seasonal trends) and conduct design of experiments (ANOVA, Latin square, factorial design) for analytical problem solving

Mapping COs with POs & PSOs:

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

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

CO3									
CO4									
CO5									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

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(25D58104E) CRYPTOGRAPHY AND NETWORKS SECURITY (PE-II)

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

COURSE OBJECTIVES:

1. To introduce the fundamentals of cryptography, security goals, and classical encryption techniques
2. To study symmetric key cryptographic algorithms and understand their structure, operation, and applications.
3. To provide the mathematical foundation required for designing and analyzing cryptographic algorithms.
4. To explore public key cryptographic schemes, key management, and digital authentication mechanisms

UNIT-I INTRODUCTION AND CLASSICAL CRYPTOGRAPHY

Introduction to Cryptography, Security Goals, Cryptographic Primitives and Protocols, Types of
Cryptosystems, Cryptanalysis Overview, Classical Cryptosystems – Substitution Ciphers, Transposition Ciphers, Product Ciphers, Confusion and Diffusion, Cryptanalysis on Classical
Ciphers, Stream and Block Cipher Concepts, Shannon's Theory of Secrecy

UNIT-II SYMMETRIC KEY CRYPTOGRAPHY

Block Cipher Principles, Feistel Network, Substitution–Permutation Network, Data Encryption
Standard (DES) – Structure, Key Generation, Round Function, DES Weak Keys, Triple DES
(3DES), Modes of Operation – ECB, CBC, CFB, OFB, CTR, Stream Cipher Model, Linear
Feedback Shift Register (LFSR) based Stream Cipher, Modern Stream Ciphers – RC4, eSTREAM

UNIT-III MATHEMATICAL FOUNDATIONS FOR CRYPTOGRAPHY

Abstract Algebra – Groups, Rings, Fields, Modular Arithmetic, Modular Inverse, Extended
Euclidean Algorithm, Fermat's Little Theorem, Euler Phi Function, Euler's Theorem, Finite Fields
– GF(p), GF(2^n), Polynomial Arithmetic, Applications of Number Theory in Cryptography.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

UNIT-IV PUBLIC KEY CRYPTOGRAPHY AND AUTHENTICATION MECHANISMS

Introduction to Public Key Cryptography, Key Distribution and Management, One-Way and
Trapdoor Functions, Diffie–Hellman Key Exchange, RSA Cryptosystem, Knapsack Cryptosystem,
ElGamal Cryptosystem, Rabin Cryptosystem, Elliptic Curve Cryptography – Elliptic Curves over
Reals and Modulo Prime, Generalized ElGamal Public Key Cryptosystem, Message Authentication
Codes (MAC), Digital Signature, Secure Hash Algorithm (SHA), Digital Signature Standard (DSS),
Key Exchange Protocols.

UNIT-V ADVANCED AND MODERN CRYPTOGRAPHIC SYSTEMS

Cryptanalysis – Differential and Linear Cryptanalysis, Time-Memory Trade-off Attack,
Cryptanalysis on Stream Ciphers, Shamir's Secret Sharing, Identity-Based Encryption (IBE),
Attribute-Based Encryption (ABE), Side-Channel Attacks, The Secure Sockets Layer (SSL), Pretty
Good Privacy (PGP), Introduction to Quantum Cryptography, Blockchain Technology, Bitcoin and
Cryptocurrency

TEXT BOOKS:

1. William Stallings, "Crpyptography and Network security Principles and Practices", Pearson/PHI.
2. Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with coding theory", Pearson.

REFERENCE BOOKS:

1. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing – Prentice Hall of India.
3. Mathematics of Public Key Cryptography by Steven D. Galbraith.

COURSE OUTCOMES:

1. Students will Understand the basic principles of cryptography and classical encryption techniques
2. Students will Apply symmetric key cryptography methods like DES, Triple DES, and stream ciphers for secure data transmission.
3. Students will Demonstrate the mathematical foundations including number theory, modular arithmetic, and finite field concepts essential for constructing cryptographic algorithms

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(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

4. Students will implement public key cryptosystems such as RSA, Diffie–Hellman, and ECC, and evaluate authentication mechanisms like digital signatures and hash functions.
5. Students will analyse the advanced cryptographic systems, modern attacks, and emerging technologies like blockchain and quantum cryptography

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 CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem. L T P C

(25D58206) ADVANCED DATABASES MANAGEMENT SYSTEMS LAB

Course Category	
Course Enrichment Relevance	

COURSE OBJECTIVES:

Cryptanalysis – Differential and Linear Cryptanalysis, Time-Memory Trade-off Attack, Cryptanalysis on Stream Ciphers, Shamir’s Secret Sharing, Identity-Based Encryption (IBE),
Attribute-Based Encryption (ABE), Side-Channel Attacks, The Secure Sockets Layer (SSL), Pretty
Good Privacy (PGP), Introduction to Quantum Cryptography, Blockchain Technology, Bitcoin and
Cryptocurrency

COURSE OUTCOMES:

Mapping COs with POs & PSOs:

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

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
0	0	4	2

(25D58105) ADVANCED DATA STRUCTURES & ALGORITHMS LAB

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

COURSE OBJECTIVES:

1. To introduce students to the implementation of linear and non-linear data structures using linked representation
2. To provide practical knowledge on stack and queue operations and their applications in problem solving.
3. To enable students to implement tree structures and perform operations like traversal, insertion, deletion, and balancing.
4. To develop skills in implementing searching and sorting techniques to improve problem□solving efficiency.
5. To expose students to advanced data structures such as AVL Trees, B-Trees, and Hashing for efficient storage and retrieval.
6. To enhance the ability to design, test, and analyze algorithms for graph traversal and dictionary

Experiment 1:
Write a program to perform various operations on single linked list
Experiment 2:
Write a program for the following
a) Reverse a linked list
b) Sort the data in a linked list
c) Remove duplicates
d) Merge two linked lists
Experiment 3: Write a program to perform various operations on doubly linked list.
Experiment 4: Write a program to perform various operations on circular linked list.
Experiment 5: Write a program for performing various operations on stack using linked list.
Experiment 6: Write a program for performing various operations on queue using linked list.
Experiment 7: Write a program for the following using stack
a) Infix to postfix conversion.
b) Expression evaluation.
Experiment 8: Write a program to implement various operations on Binary Search Tree Using
Recursive and Non-Recursive methods.
Experiment 9: Write a program to implement the following for a graph. a) BFS b) DFS

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(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

Experiment 10: Write a program to implement various Sorting Techniques
Experiment 11: Write a program to implement various Searching Techniques
Experiment 12: Write a program to implement various operations on AVL trees.
Experiment 13: Write a program to perform the following operations: a) Insertion into a B-tree
b) Searching in a B-tree
Experiment 15: Write a program to implement all the functions of Dictionary (ADT) using
Hashing.

REFERENCE BOOKS:

1. Ellis Horowitz, SartajSahni, and SanguthevarRajasekaran – Fundamentals of Computer Algorithms, Universities Press, 2008.
2. Mark Allen Weiss – Data Structures and Algorithm Analysis in C++ / Java, Pearson Education, 4th Edition, 2013.
3. Seymour Lipschutz – Data Structures with C, Schaum's Outline Series, McGraw Hill, 2011.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein – Introduction to Algorithms, MIT Press, 3rd Edition, 2009.

COURSE OUTCOMES:

1. Implement linear data structures such as single, double, and circular linked lists to perform insertion, deletion, searching, and traversal operations.
2. Apply stack and queue concepts using linked lists to solve real-world computational problems such as expression evaluation and infix-to-postfix conversion
3. Develop and test tree-based and Graph-based data structures including Binary Search Trees, AVL Trees, and B-Trees using recursive and iterative approaches, Graph traversals.
4. Implement and compare searching and sorting techniques to analyze their performance and efficiency.
5. Apply hashing techniques for efficient dictionary implementation and collision resolution
6. Analyze and evaluate the performance of different data structures to select appropriate techniques for given computational problems.

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 CSE - COMPUTER SCIENCE ENGINEERING

CO6									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

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0	0	4	2

(25D58106) DISTRIBUTED OPERATING SYSTEMS LAB

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

COURSE OBJECTIVES:

1. To provide hands-on experience in implementing synchronization, deadlock detection, and resource management algorithms in distributed and multiprocessor systems.
2. To develop the ability to design and simulate mechanisms for fault tolerance, load balancing, task migration, and secure communication using cryptographic techniques
3. To enable students to apply concurrency control methods in distributed databases and critically analyze the performance of various distributed algorithms.

Unit I: Architectures & Synchronization

1. **Implementation of Lamport's Logical Clocks** – Simulate logical clock updates in a distributed system.
2. **Vector Clocks and Causal Ordering** – Implement vector clocks and analyze message ordering.
3. **Distributed Mutual Exclusion Algorithms** – Implement Ricart-Agrawala and Maekawa's mutual exclusion algorithms.

Unit II: Deadlock Detection & Resource Management 4. **Simulation of Distributed Deadlock Detection Algorithms** – Implement centralized and distributed deadlock detection techniques.

5. **Hierarchical Deadlock Detection** – Implement a hierarchical approach to detecting deadlocks in a distributed system.

Unit III: Shared Memory, Scheduling & Fault Tolerance

6. **Implementation of Load Balancing Algorithms** – Compare load balancing techniques (static and dynamic).
7. **Task Migration Mechanism** – Implement and analyze task migration in a distributed system.

Unit IV: Security & Cryptography

8. **Access Matrix Model Implementation** – Simulate access control using an access

matrix.

9. **Implementation of Data Encryption Standard (DES) Algorithm** – Encrypt and decrypt
messages using DES.

10. **Public Key Cryptography using RSA** – Implement RSA encryption and authentication
mechanisms.

Unit V: Multiprocessor & Database OS

11. **Process Synchronization in Multiprocessor Systems** – Implement and analyze thread
synchronization.

12. **Concurrency Control using Lock-Based Algorithms** – Implement two-phase locking
protocol.

13. **Timestamp-Based Concurrency Control** – Develop a timestamp-based concurrency
control mechanism.

14. **Optimistic Concurrency Control Algorithm** – Implement an optimistic concurrency
control protocol.

REFERENCE BOOKS:

1. MukeshSinghal and Niranjan G. Shivaratri – Advanced Concepts in Operating Systems: Distributed, Database, and Multiprocessor Operating Systems, McGraw Hill, 2001
2. Andrew S. Tanenbaum and Maarten Van Steen – Distributed Systems: Principles and Paradigms, Pearson Education, 2nd Edition, 2007
3. George Coulouris, Jean Dollimore, Tim Kindberg, and Gordon Blair – Distributed Systems: Concepts and Design, Pearson Education, 5th Edition, 2012
4. Pradeep K. Sinha – Distributed Operating Systems: Concepts and Design, PHI Learning, 2008.

COURSE OUTCOMES:

1. Implement and analyze synchronization mechanisms in distributed environments
2. Develop and evaluate distributed deadlock detection techniques.
3. Design and implement distributed shared memory models and scheduling algorithms
4. Apply security and cryptographic techniques to distributed systems.
5. Implement concurrency control algorithms in database operating systems
6. Gain hands-on experience in developing efficient multiprocessor operating system components.

Mapping COs with POs & PSOs:

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									
CO6									

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem. L T P C

(25D58207) COMPREHENSIVE VIVA VOCE

Course Category	
Course Enrichment Relevance	

COURSE OBJECTIVES:

Unit I: Architectures & Synchronization

1. **Implementation of Lamport's Logical Clocks** – Simulate logical clock updates in a distributed system.
2. **Vector Clocks and Causal Ordering** – Implement vector clocks and analyze message ordering.
3. **Distributed Mutual Exclusion Algorithms** – Implement Ricart-Agrawala and Maekawa's mutual exclusion algorithms.

Unit II: Deadlock Detection & Resource Management 4. **Simulation of Distributed Deadlock Detection Algorithms** – Implement centralized and distributed deadlock detection techniques.

5. **Hierarchical Deadlock Detection** – Implement a hierarchical approach to detecting deadlocks in a distributed system.

Unit III: Shared Memory, Scheduling & Fault Tolerance

6. **Implementation of Load Balancing Algorithms** – Compare load balancing techniques (static and dynamic).
7. **Task Migration Mechanism** – Implement and analyze task migration in a distributed system.

Unit IV: Security & Cryptography

8. **Access Matrix Model Implementation** – Simulate access control using an access matrix.
9. **Implementation of Data Encryption Standard (DES) Algorithm** – Encrypt and decrypt messages using DES.
10. **Public Key Cryptography using RSA** – Implement RSA encryption and authentication mechanisms.

Unit V: Multiprocessor & Database OS

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

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11. **Process Synchronization in Multiprocessor Systems** – Implement and analyze thread
synchronization.
12. **Concurrency Control using Lock-Based Algorithms** – Implement two-phase locking
protocol.
13. **Timestamp-Based Concurrency Control** – Develop a timestamp-based concurrency
control mechanism.
14. **Optimistic Concurrency Control Algorithm** – Implement an optimistic concurrency
control protocol.

COURSE OUTCOMES:

Mapping COs with POs & PSOs:

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

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
2	0	0	2

(25D57107) RESEARCH METHODOLOGY AND IPR

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

COURSE OBJECTIVES:

1. To understand the research design process and data collection methods.
2. To develop skills in data analysis and reporting.
3. To familiarize students with intellectual property rights (IPR) and patents.
4. To apply research skills in real-world contexts.

UNIT-I UNIT I

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

Learning Outcomes

● Recall key concepts of the research process, including different types and approaches to
research, and the importance of ethics.
● Differentiate between qualitative and quantitative research approaches and the various uses
of secondary data.
● Identify the core principles of research design and ethics, including plagiarism and documentation styles.
● Explain the significance of reasoning and ethical conduct in all stages of the research
process.
● Apply knowledge of different documentation styles, such as APA and IEEE, to properly
cite sources and avoid plagiarism.

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UNIT-II UNIT II

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

Learning Outcomes

● Identify different types of data and the various methods for collecting both primary and
secondary data.
● Explain the importance of data quality and ethical considerations in data collection.
● Differentiate between primary, secondary, and Big Data sources.
● Describe the various tools and technologies used for effective data collection.
Analyze the ethical implications of data collection and ensure data quality in a research study

UNIT-III UNIT III

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

Learning Outcomes

● Apply knowledge of multivariate analysis and experimental research to develop hypotheses
and analyze data. ● Explain the process of measurement systems analysis and error propagation in experimental
design.
● Formulate clear and concise abstracts, introductions, and methodologies for research papers.
● Write effective results and discussion sections based on data analysis.
Develop comprehensive research papers and proposals based on proper data analysis and reporting
guidelines.

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

UNIT-IV UNIT IV

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.

Learning Outcomes

- Recall the fundamental concepts of Intellectual Property (IP) and its evolution.
- Describe the roles of organizations like **WIPO** and **WTO** in the establishment of IPR.
- Differentiate between various types of IPR, including trade secrets and trademarks.
- Explain the common rules and features of IPR agreements and the role of UNESCO.
- Analyze the relationship between IPR and biodiversity, and its broader impact.

UNIT-V UNIT-V

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

Learning Outcomes

- Explain the objectives, benefits, and key features of a patent, including the concept of an inventive step.
- Differentiate between the various types of patent applications and the e-filing process.
- Describe the process of patent examination, grant, and revocation.
- Identify the roles of patent agents and the process for their registration.

Analyze the concepts of equitable assignments, licenses, and licensing of related patents.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, Research Methodology: An introduction for Science & Engineering students, Juta and Company Ltd, 2004
2. Catherine J. Holland, Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets, Entrepreneur Press, 2007.
3. Cooper Donald R, Schindler Pamela S and Sharma JK, “Business Research Methods”, Tata McGraw Hill Education 11e (2012).
4. Ranjit Kumar , Research Methodology: A Step-by-Step Guide for Beginners. . David Hunt, Long Nguyen, Matthew Rodgers, “Patent searching: tools & techniques”, Wiley, 2007
5. Deborah E. Bouchoux , Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets, 6th Edition, Cengage 2024.

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

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6. Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, The Craft of Research, 5th Edition, University of Chicago Press, 2024

REFERENCE BOOKS:

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									
CO5									
CO6									

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
0	1	2	2

(25D58107) FULL STACK DEVELOPMENT USING MERN

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

COURSE OBJECTIVES:

1. Provide strong foundations in web development technologies (HTML, CSS, JavaScript, ES6).
2. Introduce server-side programming with Node.js and Express.js for building scalable applications.
3. Enable students to work with relational (MySQL) and non-relational (MongoDB) databases. Impart skills to design and develop interactive user interfaces using ReactJS
4. Impart skills to design and develop interactive user interfaces using ReactJS
5. Enhance problem-solving abilities through full-stack web application development experiments.

Module 1: Web Development Fundamentals

Fundamentals of Web Design, Webpage and Website, Web application HTML Typography,
Images, Tables, Lists, Hyperlinks etc. CSS Syntax and usage, CSS Selectors, CSS on body, CSS on
Text, CSS on Links, CSS on Tables, CSS on Lists, CSS on Forms, CSS on Images, CSS on DIV,
W3.CSS Framework

List of Experiments :

 HTML & CSS Basics – Create a personal portfolio webpage using HTML (headings, lists,
tables, hyperlinks, forms) and style it with CSS selectors.

 Responsive Layout – Develop a responsive webpage using DIV, CSS box model, and W3.CSS framework.

 Styled Components – Design a webpage for a college event with images, tables, and styled
navigation menu using CSS. **Module 2: JavaScript and ECMA Script 6**

JavaScript Fundamentals - Grammar and types, Control flow and error handling - Loops, Function -
Objects, Arrays, Promises - ES6 Let and const, Template literals - Arrow Function, Default
parameter, Async Await

List of Experiments :

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

 JavaScript Fundamentals – Build a simple calculator app using functions, loops, and control flow.
 Array & Object Manipulation – Write a program using ES6 features (let/const, arrow
functions, template literals) to manage student records.
 Async Programming – Create a webpage that fetches and displays random user data from a
public API using Promises and Async/Await.

Module 3: Node.js

overview, Node.js - basics and setup - Node.js console, Node.js command utilities - Node.js
modules, concepts - Node.js events, database access - Node.js with Express.js, Express.js
Request/Response - Express.js Get, Express.js Post - Express.js Routing, Express.js Cookies -
Express.js File Upload, Middleware - Express.js Scaffolding, Template

List of Experiments :

 Node.js Basics – Write a Node.js script to create a local server and display “Hello World” in
the browser.
 Express.js Routing – Build a REST API with Express.js that handles GET and POST requests for a student information system.
 File Handling – Develop a Node.js application to upload, read, and display a text/JSON file
using Express middleware.

Module 4: MySQL and MongoDB

MySQL Concepts - Create, Read, Update, Delete Operation - SQL and NoSQL concepts - Create
and manage MongoDB - Migration of data into MongoDB - MongoDB with NodeJS - Services
offered by MongoDB

List of Experiments :

 MySQL CRUD – Create a MySQL database for employee records and perform Create, Read, Update, Delete (CRUD) operations.
 MongoDB CRUD with Node.js – Build a Node.js application that connects to MongoDB
and manages student data.
 Migration Project – Write a script to migrate data from MySQL to MongoDB and display
it through a Node.js API.

Module 5: React JS

ReactJS introduction and overview - ReactJS installation and environment setup - Introducing JSX,

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Rendering Elements - Components and Props - State and Lifecycle - Handling Events - Conditional
Rendering - Lists and Keys, Forms - Lifting State Up

List of Experiments :

 React Components – Build a React app to display a list of courses using functional components and props.

 State & Events – Create a counter and a form component in React using useState and event
handling.

 Conditional Rendering & Lists – Develop a React to-do list application with add/delete
functionality and conditional rendering of completed tasks.

TEXT BOOKS:

1. Alex Banks, Eve Porcello – Learning React: Modern Patterns for Developing React Apps, O'Reilly.
2. StoyanStefanov – React Up & Running: Building Web Applications, O'Reilly.
3. Mario Casciaro, Luciano Mammino – Node.js Design Patterns, Packt.
4. Seyed M.M. Iravani – Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics, O'Reilly.

REFERENCE BOOKS:

1. Robin Wieruch ??? The Road to React, Leanpub.
2. Carl Rippon ??? React 18 Design Patterns and Best Practices, Packt
3. KirupaChinnathambi ??? Learning React: A Hands-On Guide to Building Web Applications, Addison-Wesley.
4. Ethan Brown ??? Web Development with Node and Express: Leveraging the JavaScript Stack, O???Reilly.
5. Kristina Chodorow ??? MongoDB: The Definitive Guide, O???Reilly
6. Ben Forta ??? SQL in 10 Minutes, Sams Teach Yourself, Sams Publishing

COURSE OUTCOMES:

1. Apply fundamental web technologies (HTML, CSS, JavaScript, ES6) to design responsive web pages.
2. Develop server-side applications using Node.js and Express.js with REST API integration.
3. Perform database operations using MySQL and MongoDB and integrate them with backend services.
4. Design and implement dynamic, component-based user interfaces using ReactJS
5. Develop and deploy full-stack applications by combining frontend, backend, and database skills.
6. Demonstrate problem-solving, debugging, and version control skills in web development projects.

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(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									
CO6									

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
2	0	0	0

(25D57109A) ENGLISH FOR RESEARCH PAPER WRITING (AC-I)

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

COURSE OBJECTIVES:

1. To equip students with the fundamentals of academic English for research paper writing.
2. To develop students' advanced reading skills for analyzing and evaluating research articles.
3. To refine students' grammar and language skills for clarity and precision in research writing.
4. To master the skills of revising, editing, and proofreading research papers.
5. To familiarize students with the role of technology and AI in research writing, including digital literacy and ethical considerations.

UNIT-I UNIT-I

:

Academic English - MAP (Message-Audience-Purpose) - Language Proficiency for Writing - Key Language Aspects - Clarity and Precision - Objectivity - Formal Tone - Integrating References - Word order - Sentences and Paragraphs - Link Words for Cohesion - Avoiding Redundancy / Repetition - Breaking up long sentences - Structuring Paragraphs - Paraphrasing Skills – Framing Title and Sub headings

UNIT-II UNIT-II

Reading Academic Texts - Critical Reading Strategies - Skimming and Scanning - Primary Research Article vs. Review Article - Reading an Abstract - Analyzing Research Articles - Identifying Arguments - Classifying Methodologies - Evaluating Findings - Making Notes

UNIT-III UNIT-III

Advanced Punctuation Usage - Grammar for Clarity - Complex Sentence Structures - Active- Passive Voice - Subject-Verb Agreement - Proper Use of Modifiers - Avoiding Ambiguous Pronoun References - Verb Tense Consistency - Conditional Sentences

UNIT-IV UNIT-IV

Effective Revisions - Restructuring Paragraph - Editing vs Proofreading, Editing for Clarity and Coherence - Rectifying Sentence Structure Issues - Proofreading for Grammatical Precision – Spellings - Tips for Correspondence with Editors - Critical and Creative Phases of Writing

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UNIT-V UNIT-V

Digital Literacy and Critical Evaluation of Online Content - Technology and Role of AI in Research Writing – Assistance in Generating Citations and References - Plagiarism and Ethical Considerations – Tools and Awareness – Fair Practices

TEXT BOOKS:

1. Bailey. S. Academic Writing: A Handbook for International Students. London and New York: Routledge,2015.
2. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

REFERENCE BOOKS:

1. Craswell, G. Writing for Academic Success, Sage Publications, 2004.
2. Peter Elbow, Writing With Power, E-book, Oxford University Press, 2007
3. Oshima, A. & Hogue, A. Writing Academic English, Addison-Wesley, New York, 2005
4. Swales, J. & C. Feak, Academic Writing for Graduate Students: Essential Skills and Tasks. Michigan University Press, 2012.
5. Goldbort R.Writing for Science, Yale University Press (available on Google Books), 2006
6. Day R.How to Write and Publish a Scientific Paper, Cambridge University Press, 2006

COURSE OUTCOMES:

1. Recall the key language aspects and structural elements of academic writing in research papers.
2. Explain the importance of clarity, precision, and objectivity in research writing.
3. Apply critical reading strategies and advanced grammar skills to analyze and write research papers.
4. Analyze research articles and identify the strengths and limitations of different methodologies.
5. Evaluate research papers to check for plagiarism, structure, clarity, and language accuracy.
6. Develop a well-structured research paper that effectively communicates complex ideas.

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 CSE - COMPUTER SCIENCE ENGINEERING

CO6									

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
2	0	0	0

(25D57109C) DISASTER MANAGEMENT (AC-I)

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

COURSE OBJECTIVES:

1. To enable the students to understand the fundamental concepts of disasters, hazards, their factors, and significance with special reference to India.
2. To prepare them to classify and analyze different types of natural and man-made disasters, their causes, magnitude, and impacts.
3. To foster them develop understanding of disaster preparedness, monitoring systems, and the role of government, community, and media.
4. To equip them in learning risk assessment techniques, disaster risk reduction strategies, and the importance of global and national cooperation.
5. To foster their ability to think critically and respond to disasters and design effective mitigation measures (structural and non-structural) with a focus on emerging trends and Indian disaster management programs.

UNIT-I UNIT-I

Disaster - Definition, Factors and Significance - Difference Between Hazard and Disaster - Natural and Man-made Disasters - Difference, Nature, Types and Magnitude - Disaster Prone Areas in India - 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 UNIT-II

Economic Damage - Loss of Human and Animal Life - Destruction of Ecosystem - Natural Disasters - Earthquakes, Volcanism, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster - Nuclear Reactor Meltdown - Industrial Accidents - Oil Slick sand Spills - Outbreaks of Disease and Epidemics War and Conflicts

UNIT-III UNIT-III

Preparedness - Monitoring of Phenomena - Triggering a Disasteror Hazard - Evaluation of RiskApplication of Remote Sensing - Data from Meteorological and Other Agencies - Media ReportsGovernmental and Community Preparedness

UNIT-IV UNIT-IV

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’s participation in Risk Assessment – Strategies for Survival

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

UNIT-V UNIT-V

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

TEXT BOOKS:

1. Gupta, H. K. Disaster Management. Universities Press, 2003
2. Singh, R. B. Natural Hazards and Disaster Management. Rawat Publications, 2006.

REFERENCE BOOKS:

1. Coppola, D. P. (2020). Introduction to International Disaster Management (4th ed.). Elsevier.
2. Shaw, R., & Izumi, T. (2022). Science and Technology in Disaster Risk Reduction in Asia. Springer.
3. Wisner, B., Gaillard, J. C., & Kelman, I. (2021). Handbook of Hazards and Disaster Risk Reduction and Management (2nd ed.). Routledge.
4. Saini, V. K. (2021). Disaster Management in India: Policy, Issues and Perspectives. Sage India.
5. Kelman, I. Disaster by Choice: How Our Actions Turn Natural Hazards into Catastrophes, Oxford University Press, 2022
6. Sahni, P. & Dhameja, A. Disaster Mitigation: Experiences and Reflections. Prentice Hall of India, 2004.

COURSE OUTCOMES:

1. Define and distinguish between hazards and disasters, and explain their types, nature, and impacts.
2. Identify and map disaster-prone areas in India and understand the epidemiological consequences of disasters.
3. Assess the economic, social, and ecological repercussions of major natural and man-made disasters.
4. Demonstrate knowledge of disaster preparedness tools such as remote sensing, meteorological data, risk evaluation, and community awareness.
5. Apply risk assessment methods and propose disaster risk reduction strategies at local, national, and global levels.
6. Formulate and evaluate structural and non-structural disaster mitigation strategies, with emphasis on Indian programs and emerging trends.

Mapping COs with POs & PSOs:

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

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

CO4									
CO5									
CO6									

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING

M.Tech. I Sem.

L	T	P	C
2	0	0	0

(25D57109D) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (AC-I)

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

COURSE OBJECTIVES:

1. To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of roots of knowledge system.
2. To make them understand the need for protecting traditional knowledge and its significance in the global economy.
3. To make them understand the legal frame work and policies related to traditional knowledge protection.
4. To enable them to understand the relationship between traditional knowledge and intellectual property rights.
5. To make them explore the applications of traditional knowledge in different sectors, such as engineering, medicine, agriculture, and biotechnology

UNIT-I UNIT-I

Introduction to traditional knowledge - Definition, Nature and characteristics, scope and importance - Kinds of traditional knowledge - Physical and social contexts in which traditional knowledge develop - Historical impact of social change on traditional knowledge systems - Indigenous Knowledge (IK) – Characteristics - traditional knowledge vis-à-vis indigenous knowledge -Traditional knowledge Vs western knowledge, traditional knowledge vis-à-vis formal knowledge.

Learning Outcomes: At the end of the unit the student will able to:

> Understand the concept of traditional knowledge.
> Contrast and compare characteristics, importance& kinds of traditional knowledge.
> Analyze physical and social contexts of traditional knowledge.
> Evaluate social change on traditional knowledge.

UNIT-II UNIT-II

Protection of traditional knowledge- Need for protecting traditional knowledge - Significance of TK Protection - Value of TK in global economy - Role of Government to harness TK.

Learning Outcomes: At the end of the unit the student will able to:

> Know the need of protecting traditional knowledge.
>Apply significance of TK protection.
>Analyze the value of TK in global economy.
> Evaluate role of government

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UNIT-III UNIT-III

Legal frame work and TK - A)The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 - Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act) – B)The Biological Diversity Act 2002 and Rules 2004 - the protection of traditional knowledge bill, 2016 - Geographical Indicators Act 2003.

Learning Outcomes: At the end of the unit the student will able to:

>Understand legal frame work of TK.

> Contrast and compare the ST and other traditional forest dwellers

> Analyze plant variant protections

> Understand the rights of farmers forest dwellers

UNIT-IV UNIT-IV

Traditional knowledge and Intellectual property - Systems of traditional knowledge protection - Legal concepts for the protection of traditional knowledge - Certain non-IPR mechanisms of traditional knowledge protection - Patents and traditional knowledge - Strategies to increase protection of traditional knowledge -Global legal FORA for increasing protection of Indian Traditional Knowledge.

Learning Outcomes: At the end of the unit the student will able to:

> Understand TK and IPR

> Apply systems of TK protection.

> Analyze legal concepts for the protection of TK.

>Evaluate strategies to increase the protection of TK.

UNIT-V UNIT-V

Traditional knowledge in different sectors - Traditional knowledge and Engineering - Traditional medicine system - TK and Biotechnology - TK in Agriculture - Traditional societies depend on it for their food and healthcare needs - Importance of conservation and sustainable development of environment - Management of biodiversity, Food security of the country and protection of TK

Learning Outcomes: At the end of the unit the student will be able to:

> Know TK in different sectors.

> Apply TK in Engineering.

>Analyze TK in various sectors.

> Evaluate food security and protection of TK in the country.

TEXT BOOKS:

1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning Pvt.Ltd. Delhi, 2022.
2. Basanta Kumar Mohanta and Vipin Kumar Singh,Traditional Knowledge System and Technology in India, PratibhaPrakashan 2012.

REFERENCE BOOKS:

1. Pride of India: A Glimpse into India's Scientific Heritage, Samskrita Bharati, New Delhi.

2. Kak, S.C. “On Astronomy in Ancient India”, Indian Journal of History of Science, 22(3), 1987
3. Subbarayappa, B.V. and Sarma, K.V. Indian Astronomy: A Source Book, Nehru Centre, Mumbai, 1985.
4. Bag, A.K. History of Technology in India, Vol. I, Indian National Science Academy, New Delhi, 1997.
5. Acarya, P.K. Indian Architecture, Munshiram Manoharlal Publishers, New Delhi, 1996.
6. Banerjea, P. Public Administration in Ancient India, Macmillan, London, 1961.
7. Kapoor Kapil, Singh Avadhesh,Indian Knowledge Systems Vol – I & II, Indian Institute of Advanced Study, Shimla, H.P., 2022

COURSE OUTCOMES:

1. Define and explain the concept of traditional knowledge, its nature, characteristics, and scope
2. Understand the need for protecting traditional knowledge and its significance in the global economy
3. Explain the legal framework and policies related to traditional knowledge protection
4. Apply traditional knowledge in different sectors, such as engineering, medicine, agriculture, and biotechnology
5. Analyze the importance of traditional knowledge in various contexts, including its historical impact and social change
6. Analyze the relationship between traditional knowledge and intellectual property rights, including patents and non-IPR mechanisms

Mapping COs with POs & PSOs:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1									
CO2									
CO3									
CO4									
CO5									
CO6									

SREC

VISION

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

MISSION

- 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.
- To establish postgraduate programs in the current and Advanced Technologies.
- To establish an R&D Consultancy through developing Industry Institute Interaction, building up exceptional infrastructure.
- To propel every individual, realize and act for the technical development of the society.

MOTTO

- Education for peace and progress