K.S.R.M.
COLLEGE OF ENGINEERING

(UGC - Autonomous)
Accredited by NAAC with A+ Grade & B.Tech. (EEE, ECE, CSE, CE and ME) Programs by NBA
An ISO 9001:2015, 14001: 2015 & 50001: 2018 Certified Institution

ACADEMIC REGULATIONS (R25PG)
COURSE STRUCTURE AND SYLLABI

(Effective for the students admitted into I year
from the academic year 2025 -2026 onwards)

MASTER OF TECHNOLOGY (M.Tech.)
EMBEDDED SYSTEM AND VLSI
(Regular, Full-time)

K.S.R.M. COLLEGE OF ENGINEERING

VISION:

To evolve as a centre of repute for providing quality academic programs amalgamated with creative learning and research excellence to produce graduates with leadership qualities, ethical and human values to serve the nation.

MISSION:

M1. Provide high quality education with enriched curriculum blended with impactful Teaching-Learning practices.

M2. Promote Research, Entrepreneurship and Innovation through industry collaborations.

M3. Produce highly competent professional leaders for contributing to socio-economic development of the region and the nation.

DEPARTMENT

OF

ELECTRONICS AND COMMUNICATION ENGINEERING

VISION

To emerge as globally recognized department in the frontier areas of Electronics and Communication Engineering.

MISSION

M1. To imbibe experiential, lifelong learning skills and problem-solving capabilities through enriched curriculum and innovative teaching learning practices.

M2. To promote quality research by strengthening industry collaborations.

M3. To inculcate entrepreneurial attitude, leadership skills, human values and professional ethics.

M.TECH. EMBEDDED SYSTEMS AND VLSI

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1. To equip postgraduates with advanced knowledge and analytical skills in Embedded systems and VLSI for solving complex engineering problems and conducting quality research.

PEO2. To enable postgraduates to contribute effectively in Embedded systems and Semiconductor manufacturing, research organizations, academia, and industries by applying appropriate tools and technologies.

PEO3. To foster innovation and promote lifelong learning in emerging areas of embedded systems, Internet of Things, IC design and Semiconductor manufacturing.

PEO4. To develop professional ethics, communication skills, and leadership qualities to work effectively in multidisciplinary teams and contribute to sustainable development.

PROGRAM OUTCOMES (POs)

After successful completion of the program, postgraduates will be able to

PO1. Apply advanced concepts of embedded systems and IC Design to analyze and solve complex engineering problems using modern tools and techniques.

PO2. Conduct research and investigations to address challenges in embedded systems, Internet of Things, Analog and Digital IC Design.

PO3. Design efficient and sustainable embedded system components and semiconductor manufacturing that meet performance, safety, and environmental requirements.

PO4. Use advanced software, simulation tools, and project management skills for analysing and executing embedded system and VLSI projects.

PO5. Communicate technical information effectively and uphold ethical standards in professional practice and decision-making.

PO6. Pursue lifelong learning and understand the social, environmental, and global impact of embedded systems and VLSI Technology solutions.

K.S.R.M. COLLEGE OF ENGINEERING

(AUTONOMOUS)

Academic Regulations of M.Tech. (Full Time/Regular) Programme

(Effective for the students admitted into I year from the Academic Year 2025-26 and onwards)

K.S.R.M. College of Engineering (KSRMCE) 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 affiliating university Jawaharlal Nehru Technological University Anantapur 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 and are as follows:

Discipline	**Name of the Specialization**	**Code**
Civil Engineering	Geo Technical Engineering	12
Electrical and Electronics Engineering	Power Systems	52
Mechanical Engineering	Renewable Energy	99
Computer Science and Engineering	Artificial Intelligence and Data Science	98
Electronics & Communication Engineering	Embedded Systems & VLSI	84

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/specialization.
2.	Elective Courses	Professional Elective Courses (PE)	Includes elective courses related to the parent discipline / department / branch of Engineering
		Open Elective Courses (OE)	Elective courses which include inter-disciplinary courses or courses in an area outside the parent discipline which are of importance in the context of special skill development
3.	Mandatory Courses	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

S. No.	Broad Course Classification	Course Category	Description
		Short Term Industry Internship	To provide real time exposure
		Dissertation	To provide application of domain knowledge to solve real problems
5.	Audit Courses	Mandatory non-credit courses	Covering courses 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 Semester-End 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 semester-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 course - wise (irrespective of credits assigned), for a maximum of 100 marks for theory and 100 marks for practical, based on Internal Evaluation and Semester-End Examination.

8.1 There shall be five units in each of the theory courses. For the theory courses 60 marks will be for the Semester-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 sub-questions.

8.4 For practical courses, 60 marks shall be for the Semester-End 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 semester-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 course if he secures a minimum of 40% of marks in the Semester-End Examination and a minimum aggregate of 50% of the total marks in the Semester-End Examination and Internal Evaluation taken together.

8.7 In case the candidate does not secure the minimum academic requirement in any of the courses he/she has to reappear for the Semester-End Examination either supplementary or regular in that course or repeat the course when next offered or do any other specified course 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 University 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, students are allowed to do up to a maximum of 40% of the Professional and Open Electives in a semester through SWAYAM/SWAYAM Plus.

9.1 The college offers 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 college, it is mandatory for the student to share necessary information with the college

9.4 The institution will list out 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 will 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 JNTUA 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 semester-end 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 semester-end exam may be conducted by the National Testing Agency (NTA), the National Programme on Technology Enhanced Learning (NPTEL) or the College during the regular end-term exams. Evaluation shall comprise 60% weightage for the semester-end 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 also ensures that the student completes the course and produces 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 will 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 college will ensure no overlap of SWAYAM MOOC exams with that of the semester-end examination schedule. In case of delay in SWAYAM results, the college 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 institution maintains the following in the examination section and submits as and when demanded by the university:

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 college will 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 are 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 Principal with the recommendations of the concerned HoD and Dean, Academics 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 course 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 courses for which the Internal Evaluation marks secured are more than 50%.

10.3 Out of the courses 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 course and for a maximum of **three** Theory courses for Improvement of Internal evaluation marks.

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

10.5 For re-registration, the candidates have to apply to the Principal through the respective HoD by paying the requisite fees and get approval from the Principal before the start of the semester in which re-registration is required

10.6 In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the Semester-End Examinations marks secured in the previous attempt(s) for the reregistered courses 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 requirements in all the courses, 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. Student shall initiate the project work, only after obtaining the approval of the PRC.

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 College. For this, a panel of three examiners shall be submitted by the supervisor concerned and department head for each student. However, the dissertation will be adjudicated by one examiner nominated by the Principal.

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 taking the approval from the Principal.

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 College.

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 Principal. The student must secure a minimum of 50% marks to be declared as passed

14 Credits for Co-curricular Activities

A Student should earn 01 credits under the head of co-curricular activities, viz., attending Conference, Scientific Presentations and Other Scholarly Activities.

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 course 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 course shall be considered failed and will be required to reappear for that course 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} course 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.,

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

   where "S_i" is the SGPA of the i^{th} semester and C_j 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 courses 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 Academic Council 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 courses as and when courses 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 College 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 College.

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RULES FOR

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

S.No.	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 course 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 course of the examination).	Expulsion from the examination hall and cancellation of the performance in that course only.
1.(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 course 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 course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four 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. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The candidate is also debarred for four consecutive semesters from class work and all University examinations if his

S.No.	Nature of Malpractices / Improper conduct	Punishment
	If the candidate:	
		involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course 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 in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester / year. If the candidate physically assaults the invigilator / officer-in-charge of the 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.

S.No.	Nature of Malpractices / Improper conduct	Punishment
	If the candidate:	
	of the examination.	
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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	Possessany lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 course only or in that course and all other courses the candidate has appeared including practical examinations and project work of that semester / year

S.No.	Nature of Malpractices / Improper conduct	Punishment
	If the candidate:	
		examinations, depending on the recommendation of the committee.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

1. Malpractices identified by squad or special invigilators
2. Punishments to the candidates as per the above guidelines.
3. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
4. A show cause notice shall be issued to the college.
5. Impose a suitable fine on the college.
6. Shifting the examination center 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 course/courses due to Malpractice, he has to register for End Examinations in that course/courses consequently and has to fulfil all the norms required for the award of Degree.

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COURSE STRUCTURE
M.Tech. EMBEDDED SYSTEMS AND VLSI
I-SEMESTER

S. No.	Course Code	Course Title	Category	Hours per week			Credits
				L	T	P	
1.	2584101	CMOS Digital IC Design	PC	3	0	0	3
2.	2584102	Microcontrollers and Programmable Digital Signal Processors	PC	3	0	0	3
3.	**Program Elective-I**		PE	3	0	0	3
	2584103	Communication Buses and Interfaces					
	2584104	Data Acquisition System Design					
	2584105	FPGA Architectures and Applications					
4.	**Program Elective-II**		PE	3	0	0	3
	2584106	Low Power VLSI Design					
	2584107	Scripting Languages for VLSI					
	2584108	Network Security and Cryptography					
5.	2584151	CMOS Digital IC Design Lab	PC	0	0	4	2
6.	2584152	Microcontrollers and Programmable Digital Signal Processors Lab	PC	0	0	4	2
7.	2584153	IoT and RTOS for Embedded Applications	SE	0	1	2	2
7.	2599171	Research Methodology and Intellectual Property Rights	MC	2	0	0	2
8.	**Audit Course–I**		AC	2	0	0	2
	2599181	English for Research Paper Writing					
	2512181	Disaster Management					
	2598181	Essence of Indian Traditional Knowledge					
			TOTAL	**16**	**1**	**10**	**22**

2584101	M.Tech., I-SEMESTER CMOS DIGITAL IC DESIGN (EMBEDDED SYSTEMS AND VLSI)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Demonstrate advanced knowledge in Static and dynamic characteristics of CMOS,

CO2. Estimate Delay and Power of Adders circuits.

CO3. Classify different semiconductor memories.

CO4. Analyze, design and implement combinational and sequential MOS logic circuits.

CO5. Analyze complex engineering problems critically in the domain of digital IC design for conducting research.

SYLLABUS:

UNIT–I:MOS DESIGN PSEUDO NMOS LOGIC (09 Periods)

Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II: COMBINATIONAL MOS LOGIC CIRCUITS (09 Periods)

MOS logic circuits with NMOS loads, Primitive CMOS logic gates–NOR & NAND gate, Complex Logic circuits design–Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III: SEQUENTIAL MOS LOGIC CIRCUITS (08 Periods)

Behavior of bi-stable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop

UNIT-IV: DYNAMIC LOGIC CIRCUITS (09 Periods)

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V:SEMICONDUCTOR MEMORIES (10 Periods)

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.

Total Periods: 45

Text Books:

T1. Neil Weste, David Harris, "CMOS VLSI Design: A Circuits and Systems Perspective", 4th Edition, Pearson, 2010

T2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

T3. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Edition, 2011.

Reference Books:

R1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011

R2. Digital Integrated Circuits – A Design Perspective, Jan M.Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2ndEdition, PHI.

2584102	M.Tech., I-SEMESTER MICROCONTROLLERS AND PROGRAMMABLE DIGITAL SIGNAL PROCESSORS (EMBEDDED SYSTEMS AND VLSI)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

CO1. Explain ARM Cortex-Mx architecture, registers, instruction sets, memory system, and pipeline.

CO2. Analyze exceptions, interrupts, NVIC configuration, SysTick, and interrupt latency.

CO3. Apply LPC17xx peripherals (GPIO, timers, ADC, UART, PWM, RTC, WDT) for embedded applications.

CO4. Differentiate P-DSP architectural features (Harvard, MAC, barrel shifter, multi-port memory).

CO5. Demonstrate VLIW/TMS320C6000 architecture and write assembly programs using addressing modes.

SYLLABUS:

UNIT–I: ARM CORTEX-MX PROCESSOR (09 Periods)

Applications, Programming model – Registers, Operation - modes, Exceptions and Interrupts, Reset Sequence, Instruction Set (ARM and Thumb), Unified Assembler Language, Memory Maps, Memory Access Attributes, Permissions, Bit-Band Operations, Unaligned and Exclusive Transfers. Pipeline, Bus Interfaces.

UNIT-II: EXCEPTIONS AND INTERRUPTS IN ARM CORTEX-MX PROCESSORS (09 Periods)

Exceptions, Types, Priority, Vector Tables, Interrupt Inputs and Pending behaviour, Fault Exceptions, Supervisor and Pendable Service Call, Nested Vectored Interrupt Controller, Basic Configuration, SYSTICK Timer, Interrupt Sequences, Exits, Tail Chaining, Interrupt Latency.

UNIT-III: LPC 17XX MICROCONTROLLER (09 Periods)

LPC 17xx microcontroller- Internal memory, GPIOs, Timers, ADC, UART and other serial interfaces, PWM, RTC, WDT.

UNIT-IV: PROGRAMMABLE DSP (P-DSP) PROCESSORS (09 Periods)

Programmable DSP (P-DSP) Processors: Harvard architecture, Multi port memory, architecturalstructure of P-DSP- MAC unit, Barrel shifters, Introduction to TI DSP processor family.

UNIT-V: VLIW ARCHITECTURE AND TMS320C6000 SERIES (09 Periods)

VLIW architecture and TMS320C6000 series, architecture study, data paths, cross paths,Introduction to Instruction level architecture of C6000 family, Assembly Instructions memory addressing, for arithmetic, logical operations.

Total Periods: 45

Textbooks:

T1. Joseph Yiu, “The definitive guide to ARM Cortex-M3”, Elsevier, 2nd Edition

T2. Venkatramani B. and Bhaskar M. “Digital Signal Processors: Architecture, Programming and Applications”, TMH, 2nd Edition.

Reference Books:

R1. Sloss Andrew N, Symes Dominic, Wright Chris, “ARM System Developer's Guide: Designing and Optimizing”, Morgan Kaufman Publication.

R2. Steve furber, “ARM System-on-Chip Architecture”, Pearson Education

R3. Frank Vahid and Tony Givargis, “Embedded System Design”, Wiley

R4. Technical references and user manuals on www.arm.com, NXP Semiconductor,www.nxp.com and Texas Instruments www.ti.com

2584103	M.Tech., I-SEMESTER COMMUNICATION BUSES AND INTERFACES (EMBEDDED SYSTEMS AND VLSI) (PROFESSIONAL ELECTIVE-I)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Differentiate various serial bus standards (RS232, RS485, I2C, SPI) with respect to features, limitations, and applications.

CO2. Analyze CAN bus architecture, layers, frame formats, and applications.

CO3. Explain PCIe configuration, protocols, and applications.

CO4. Interpret USB transfer types, descriptors, and device enumeration process.

CO5. Evaluate Serial FPDP configurations, frames, and transmission techniques.

SYLLABUS:

UNIT-I: SERIAL BUSES **(09 Periods)**

Cables, Serial buses, serial versus parallel, Data and Control Signal- data frame, data rate, features, Limitations and applications of RS232, RS485, I2C, SPI

UNIT-II: CAN ARCHITECTURE **(09 Periods)**

ISO 11898-2, ISO 11898-3, Data Transmission- ID allocation, Bit timing, Layers- Application layers, Object layer, Transfer layer, Physical layer, Frame formats- Data frame, Remote frame, Error frame, Overload frame, Ack slot, Interframe spacing, Bit spacing, Applications.

UNIT-III: PCIe **(09 Periods)**

Revision, Configuration space- configuration mechanism, Standardized registers, Bus enumeration, Hardware and Software implementation, Hardware protocols, Applications.

UNIT-IV: USB **(09 Periods)**

Transfer Types- Control transfers, Bulk transfer, Interrupt transfer, Isochronous transfer. Enumeration- Device detection, Default state, Addressed state, Configured state, enumeration sequencing. Descriptor types and contents- Device descriptor, configuration descriptor, Interface descriptor, Endpoint descriptor, String descriptor. Device driver.

UNIT-V: DATA STREAMING SERIAL COMMUNICATION PROTOCOL **(09 Periods)**

Serial Front Panel Data Port (SFPDP) configurations, Flow control, serial FPDP transmission frames, fiber frames and copper cable.

Total Periods: 45

Textbooks:

T1. A Comprehensive Guide to controller Area Network – Wilfried Voss, Copperhill Media Corporation, 2nd Ed., 2005.

T2. Serial Port Complete-COM Ports, USB Virtual Com Portsand Ports for Embedded Systems-Jan Axelson, Lakeview Research, 2nd Ed.,

Reference Books:

R1. USB Complete – Jan Axelson, Penram Publications.

R2. PCI Express Technology – Mike Jackson, Ravi Budruk, Mindshare Press.

2584104	M.Tech., I-SEMESTER DATA ACQUISITION SYSTEM DESIGN (EMBEDDED SYSTEMS AND VLSI) (PROFESSIONAL ELECTIVE-I)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Explain the fundamentals of data acquisition systems.
CO2. Analyze different configurations of data acquisition systems.
CO3. Demonstrate knowledge of DAQ hardware components
CO4. Compare and contrast various communication buses and interfaces
CO5. Design and develop data acquisition systems by integrating hardware and software.

SYLLABUS:

UNIT-I: INTRODUCTION TO DAQ AND SIGNAL CONDITIONING (09 Periods)

Fundamentals of Data Acquisition Systems, Sensors and Transducers, Signal conditioning - Introduction, Types of signal conditioning, Classes of signal conditioning, DAQ Hardware, DAQ Software, Communications Cabling, Parameters of a DAQ System.

UNIT-II: DAQ SYSTEM CONFIGURATIONS AND I/O INTERFACES (09 Periods)

Data acquisition system configuration, Computer plug in I/O, Distributed I/O, Stand-alone or distributed loggers/controllers- Introduction, Methods of operation, Stand-alone logger/controller hardware, firmware & software design, Communications hardware interface, Host software, Considerations, internal systems, USB overall structure, PCMCIA card

UNIT-III: DATA ACQUISITION SYSTEMS (09 Periods)

Hardware-Introduction, Plug-in DAQ Systems, Converters A/D, Converters D/A, Amplifier, Multiplexer/De-multiplexer, Power Management, Timing System, Filtering, Memory Board, Bus Interface.

UNIT-IV: DAQ COMMUNICATION TECHNOLOGIES AND STANDARDS (08 Periods)

Communication Bus-Bus and FireWire, Serial Communications, Wireless, Ethernet and Bluetooth, GSM for Data Acquisition System, PCI and PCI Express, Standard VME.

UNIT-V: DESIGN OF DATA ACQUISITION SYSTEM (10 Periods)

Introduction to the Design, Functional Design of high-Speed Computers-Based DAS, Portable DAS, Design Guidelines for High-PerformanceMultichannel. Software for Data Acquisition Systems, Introduction to LabVIEW, Android forDAQ, Design of Firmware, Example of Implementation of a Software.

Total Periods: 45

Textbooks:

T1. Maurizio Di Paolo Emilio “Data acquisition systems-from fundamentals to applied design” springer, 013.
T2. John Park and Steve Mackay “Practical Data acquisition for instrumentation and control systems” Elsevier, 2003.

Reference Books:

R1. Robert H King, “Introduction to Data Acquisition with LabVIEW”, 2nd edition, 2012, McGraw

2584105	M.Tech., I-SEMESTER FPGA ARCHITECTURES AND APPLICATIONS (EMBEDDED SYSTEMS AND VLSI) (PROFESSIONAL ELECTIVE-I)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Acquire knowledge about various architectures and device technologies of PLD's.

CO2. Comprehend FPGA Architectures.

CO3. Analyze System level Design and their application for Combinational and Sequential Circuits.

CO4. Familiarize with Anti-Fuse Programmed FPGAs.

CO5. Apply knowledge of this subject for various design applications.

SYLLABUS:

UNIT-I: INTRODUCTION TO PROGRAMMABLE LOGIC DEVICES (09 Periods)

Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices–Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II: FIELD PROGRAMMABLE GATE ARRAYS (10 Periods)

Field Programmable Gate Arrays: Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, and Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, and Applications of FPGAs.

UNIT-III: SRAM PROGRAMMABLE FPGAs (08 Periods)

Introduction, Programming Technology, Device Architecture, the Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT-IV: ANTI-FUSE PROGRAMMED FPGAs (09 Periods)

Introduction, Programming Technology, Device Architecture, The Actel ACT1, ACT2 and ACT3 Architectures.

UNIT–V: DESIGN APPLICATIONS (09 Periods)

General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture

Total Periods: 45

Textbooks:

T1. Field Programmable Gate Array Technology - Stephen M. Trim Berger, Springer International Edition.

T2. Digital Systems Design - Charles H. Roth Jr, Lizy Kurian John, Cengage Learning.

Reference Books:

R1. Field Programmable Gate Arrays-John V.Oldfield, Richard C.Dorf, Wiley India.

R2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/SamihaMourad, Pearson Low Price Edition.

R3. Digital Systems Design with FPGAs and CPLDs-Ian Grout, Elsevier,Newnes.

R4. FPGA based System Design-Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.

2584106	M.Tech., I-SEMESTER LOW POWER VLSI DESIGN (EMBEDDED SYSTEMS AND VLSI) (PROFESSIONAL ELECTIVE-II)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Understand the need for low-power circuit design and analyze various sources of power dissipation.

CO2. Apply different low-power design methodologies to reduce power consumption.

CO3. Design and compare low-voltage, low-power adder architectures using various CMOS logic styles and evaluate their performance.

CO4. Analyze and implement low-power multiplier architectures for efficient arithmetic operations.

CO5. Describe and evaluate low-voltage, low-power memory design techniques.

SYLLABUS:

UNIT-I: FUNDAMENTALS (10 Periods)

Need for Low Power Circuit Design, Sources of Power Dissipation – Static and Dynamic Power Dissipation, Short Circuit Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT-II: LOW-POWER DESIGN APPROACHES (09 Periods)

Low-Power Design through Voltage Scaling – VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches. Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT-III: LOW-VOLTAGE LOW-POWER ADDERS (09 Periods)

Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques – Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT-IV: LOW-VOLTAGE LOW-POWER MULTIPLIERS (08 Periods)

Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT-V: LOW-VOLTAGE LOW-POWER MEMORIES: (09 Periods)

Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Pre-charge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

Total Periods: 45

Textbooks:

T1. CMOS Digital Integrated Circuits – Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 2011
T2. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

Reference Books:

R1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.
R2. Low Power CMOS Design – Anantha Chandrakasan, IEEE Press/Wiley International, 1998.
R3. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.

2584107	M.Tech., I-SEMESTER SCRIPTING LANGUAGES FOR VLSI (EMBEDDED SYSTEMS AND VLSI) (PROFESSIONAL ELECTIVE-II)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Gain fluency in programming with scripting languages

CO2. Create and run scripts using PERL/TCL/PYTHON in CAD Tools

CO3. Create and run scripts using advanced PERL/TCL

CO4. Demonstrate the use of PERL/PYTHON/ TCL in developing system and web applications

CO5. Develop a real time project using PERL/PYTHON

SYLLABUS:

UNIT-I: INTRODUCTION TO SCRIPTS AND SCRIPTING (09 Periods)

Basics of Linux, Origin of Scripting languages, scripting today, Characteristics and uses of scripting languages.

UNIT-II: PERL (08 Periods)

Introduction to PERL, Names and values, Variables and assignment, Scalar expressions, Control structures, Built-in functions, Collections of Data, Working with arrays, Lists and hashes, Simple input and output, Strings, Patterns and regular expressions, Subroutines, Scripts with arguments.

UNIT-III: ADVANCED PERL (09 Periods)

Finer points of Looping, Subroutines, Using Pack and Unpack, working with files, Type globs, Eval, References, Data structures, Packages, Libraries and modules, Objects and modules in action, tied variables, interfacing to the operating systems, Security issues.

UNIT-IV: TCL (09 Periods)

The TCL phenomena, Philosophy, Structure, Syntax, Parser, Variables and data in TCL, Control flow, Data structures, Simple input/output, Procedures, Working with Strings, Patterns, Files and Pipes, Example code.

UNIT-V: ADVANCED TCL (10 Periods)

The eval, source, exec and up-level commands, Libraries and packages, Namespaces, trapping errors, Event-driven programs, Making applications 'Internet-aware', 'Nuts-and-bolts' internet programming, Security issues, TCL and TK integration.

PYTHON: Introduction to PYTHON language, PYTHON-syntax, statements, functions, Built-in functions and Methods, Modules in PYTHON, Exception Handling.

Total Periods: 45

Textbooks:

T1. The World of Scripting Languages- David Barron, Wiley Student Edition.

T2. PYTHON Web Programming, Steve Holden and David Beazley, New Riders Publications

Reference Books:

R1. TCL/TK: A Developer's Guide- ClifFlynt, Morgan Kaufmann Series.

R2. Core PYTHON Programming, Chun, Pearson Education.

R3. Learning Perl, Randal L. Schwartz, O' Reilly publications 6th edition.

R4. Linux: The Complete Reference", Richard Peterson McGraw Hill Publications, 6th Edition.

2584108	M.Tech., I-SEMESTER NETWORK SECURITY AND CRYPTOGRAPHY (EMBEDDED SYSTEMS AND VLSI) (PROFESSIONAL ELECTIVE-II)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Explain the need for Security, identify different attacks, and apply Classical encryption techniques with basic Cryptanalysis.

CO2. Apply number theory concepts such as modular arithmetic, theorems, and algorithms in solving Cryptographic Problems.

CO3. Demonstrate symmetric Encryption Algorithms and Analyze their Resistance to Cryptanalysis.

CO4. Apply Public-Key Cryptographic techniques, hash functions, and message authentication codes for secure Communication.

CO5. Evaluate authentication Protocol, Intrusion detection methods and system- level security mechanisms for protecting networks.

SYLLABUS:

UNIT-I: SECURITY **(09 Periods)**

Need, security services, Attacks, OSI Security Architecture, one-time passwords, Model for Network security, Classical Encryption Techniques like substitution ciphers, Transposition ciphers, Cryptanalysis of Classical Encryption Techniques.

UNIT-II: NUMBER THEORY **(08 Periods)**

Introduction, Fermat's and Euler's Theorem, The Chinese Remainder Theorem, Euclidean Algorithm, Extended Euclidean Algorithm, and Modular Arithmetic.

UNIT-III: PRIVATE-KEY (SYMMETRIC) CRYPTOGRAPHY **(09 Periods)**

Block Ciphers, Stream Ciphers, RC4 Stream cipher, Data Encryption Standard (DES), Advanced Encryption Standard (AES), Triple DES, RC5, IDEA, Linear and Differential Cryptanalysis.

UNIT-IV: PUBLIC-KEY (ASYMMETRIC) CRYPTOGRAPHY **(09 Periods)**

RSA, Key Distribution and Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, Message Authentication Code, hash functions, message digest algorithms: MD4 MD5, Secure Hash algorithm, RIPEMD-160, HMAC.

UNIT-V: AUTHENTICATION AND SYSTEM SECURITY **(10 Periods)**

IP and Web Security Digital Signatures, Digital Signature Standards, Authentication Protocols, Kerberos, IP security Architecture, Encapsulating Security Payload, Key Management, Web Security Considerations, Secure Socket Layer, Secure Electronic Transaction Intruders, Intrusion Detection, Password Management, Worms, viruses, Trojans, Virus Countermeasures, Firewalls, Trusted Systems.

Total Periods: 45

Textbooks:

T1. William Stallings, "Cryptography and Network Security, Principles and Practices", Pearson Education, 3rd Edition.

T2. Charlie Kaufman, Radia Perlman and Mike Speciner, “Network Security, Private Communication in a Public World”, Prentice Hall, 2ND Edition.

Reference Books:

R1. Christopher M. King, Ertem Osmanoglu, Curtis Dalton, “Security Architecture, Design Deployment and Operations”, RSA Pres,
R2. Stephen Northcutt, LenyZeltser, Scott Winters, Karen Kent, and Ronald W. Ritchey, “Inside Network Perimeter Security”, Pearson Education, 2ndEdition
R3. Richard Bejtlich, “The Practice of Network Security Monitoring: Understanding IncidentDetection and Response”, William Pollock Publisher, 2013.

2584151	M.Tech., I-SEMESTER CMOS DIGITAL IC DESIGN LAB (EMBEDDED SYSTEMS AND VLSI)	L	T	P	C
		0	0	4	2

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Explain the VLSI Design Methodologies using any VLSI design tool.

CO2. Grasp the significance of various design logic Circuits in full-custom IC Design.

CO3. Explain the Physical Verification in Layout Extraction.

CO4. Fully appreciate the design and analyze of CMOS Digital Circuits.

CO5. Grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation.

SYLLABUS:

The students are required to design and implement the Circuit and Layout using CMOS Technology.

1. Inverter Characteristics.
2. NAND and NOR Gate
3. XOR and XNOR Gate
4. 2:1 Multiplexer
5. Full Adder
6. RS-Latch
7. Clock Divider
8. JK-Flip Flop
9. Synchronous Counter
10. Asynchronous Counter
11. Static RAM Cell
12. Dynamic Logic Circuits
13. Linear Feedback Shift Register

Lab Requirements:

Software:

Mentor Graphics Tool/ Cadence/ Synopsys/Industry Equivalent Standard Software

Hardware:

Personal Computer with necessary peripherals, configuration and operating System.

2584152	M.Tech., I-SEMESTER MICROCONTROLLERS AND PROGRAMMABLE DIGITAL SIGNAL PROCESSORS LAB (EMBEDDED SYSTEMS AND VLSI)	L	T	P	C
		0	0	4	2

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Install, configure and utilize tool sets for developing applications based on ARM processor.

CO2. Design and developtheARM7 based embedded systems for various applications.

CO3. Develop application programs on ARM and DSP development boards both in assembly and C.

CO4. Design and implement the digital filters on DSP6713 processor.

CO5. Analyze the hardware and software interaction and integration.

SYLLABUS:

Any 12 experiments need to be done, Minimum 02 from Part B

Part A

Experiments to be carried out on Cortex-Mx development boards and using GNU tool- chain

1. Blink an LED with software delay, delay generated using the SysTick timer.
2. System clock real time alteration using the PLL modules.
3. Control intensity of an LED using PWM implemented in software and hardware.
4. Control an LED using switch by polling method, by interrupt method and flash the LED once every five switch presses.
5. UART Echo Test.
6. Take analog readings on rotation of rotary potentiometer connected to an ADC channel.
7. Temperature indication on an RGB LED.
8. Mimic light intensity sensed by the light sensor by varying the blinking rate of an LED.
9. Evaluate the various sleep modes by putting core in sleep and deep sleep modes.
10. System reset using watchdog timer in case something goes wrong.
11. Sample sound using a microphone and display sound levels on LEDs.

Part B

Experiments to be carried out on DSP C6713 evaluation kits and using Code Composer Studio (CCS)

12. To develop an assembly code and C code to compute Euclidian distance between any two Points
13. To develop assembly code and study the impact of parallel, serial and mixed execution
14. To develop assembly and C code for implementation of convolution operation
15. To design and implement filters in C to enhance the features of given input sequence/signa

Software Requirements:

Keil for ARM, Code Composer Studio

Hardware Requirements:

ARM Cortex Mx Development Boards, TI TMS C6713 evaluation kit.

2584153	M.Tech., I-SEMESTER IOT AND RTOS FOR EMBEDDED APPLICATIONS (EMBEDDED SYSTEMS AND VLSI)	L	T	P	C
		0	1	2	2

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Demonstrate interfacing of sensors and actuators with IoT devices.

CO2. Acquire and integrate sensor data with cloud platforms using IoT protocols.

CO3. Apply RTOS concepts for multitasking and task scheduling.

CO4. Implement inter-process communication techniques in RTOS.

CO5. Design and develop IoT applications using embedded systems and RTOS.

SYLLABUS:

Module 1: IoT HARDWARE & SENSORS (05 Periods)

Introduction to IoT and embedded devices, Raspberry Pi and Beagle Bone Black: Architecture, GPIO, SPI, I2C interfaces, Basics of interfacing digital and analog sensors/actuators, Interfacing LEDs, Buzzer, Push Button, IR, and LDR sensors.

Experiments:

1. Setup Raspberry Pi, install OS and necessary software, test basic connectivity.
2. Interface LED and Buzzer; write Python program to blink LED periodically.
3. Interface Push Button or IR/LDR sensor; program to control LED based on input.

Module 2: IoT DATA COLLECTION & CLOUD INTEGRATION (05 Periods)

Reading environmental sensors (temperature, humidity), IoT communication protocols: MQTT, HTTP, REST APIs, Cloud integration using Thingspeak, MQTT brokers.

Experiments:

1. Interface DHT11 sensor with Raspberry Pi; display temperature and humidity readings.
2. Upload sensor data to Thingspeak cloud and retrieve for visualization.
3. Publish and subscribe sensor data using MQTT on BeagleBone Black.

Module 3: REAL-TIME OPERATING SYSTEMS (RTOS) FUNDAMENTALS (06 Periods)

Differences between Traditional OS and RTOS, Hard vs. Soft real-time systems; timing constraints and task scheduling, and multitasking concepts, Scheduling algorithms.

Experiments:

1. Introduction to VxWorks RTOS: kernel, task assignment, and multitasking basics.
2. Timer programming in VxWorks.
3. Create tasks and implement Round Robin scheduling.

Module 4: INTER-PROCESS COMMUNICATION (IPC) IN RTOS (07 Periods)

Task synchronization and communication, Semaphores: Binary and Counting, Message queues and mailboxes, Mutexes and critical sections.

Experiments:

1. Task communication using message queues in VxWorks.
2. Synchronize tasks using semaphores.

3. Implement IPC using mailboxes for data exchange between tasks.

Module 5: IoT APPLICATION DESIGN (07 Periods)

Designing integrated IoT solutions combining sensors, actuators, cloud, and RTOS tasks

Experiments (Choose one):

1. Design a weather monitoring system with real-time cloud data upload.
2. Smart home automation: Control lights/fans based on sensor inputs.
3. IoT-based vending machine prototype using VxWorks and sensors.

References:

R1. ArshdeepBahga and Vijay Madisetti, *Internet of Things: A Hands-on Approach*, Universities Press, 2015.

R2. Jane W.S. Liu, *Real-Time Systems*, Pearson Education, Asia, 2018.

R3. Wind River Systems Inc., *VxWorks Programmers Guide*, 2019.

R4. C. M. Krishna and G. Shin, *Real-Time Systems*, McGraw-Hill, 2015.

R5. Practical Python Programming for IoT: Build advanced IoT projects using Raspberry Pi, MQTT, RESTful APIs, WebSockets, and Python 3, 2020.

		L	T	P	C
2599171	**M.Tech., I-SEMESTER** **RESEARCH METHODOLOGYAND INTELLECTUAL PROPERTY RIGHTS** (Common to AIDS, PS, Geo-Tech, RE, ES&VLSI) (MANDATORY COURSE)	**2**	**0**	**0**	**2**

Pre-Requisites: NIL

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Demonstrate the research process, types and methods, use data correctly, follow ethical rules, and use proper citation styles.

CO2. Apply appropriate data collection methods, identify data types and sources, ensure quality, and follow ethical practices using suitable tools.

CO3. Apply multivariate analysis and experimental design to study cause-effect relationships, ensure measurement validity, and write structured research papers and proposals.

CO4. Demonstrate the concept, evolution, and types of Intellectual Property Rights (IPR), recognize global IPR practices and institutions like WIPO, WTO, and UNESCO, and identify key agreements, trade secrets, and biodiversity-related rights.

CO5. Demonstrate the concept, features, and benefits of patents; identify types of patent applications and the filing process; and explain the roles of patent agents, licensing, and patent regulations.

SYLLABUS:

UNIT–I: FUNDAMENTALS OF RESEARCH METHODOLOGY (05 Periods)

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

UNIT-II: DATA COLLECTION AND SOURCES (05 Periods)

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

UNIT-III: DATA ANALYSIS AND REPORTING (06 Periods)

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

UNIT- IV: UNDERSTANDING INTELLECTUAL PROPERTY RIGHTS (07 Periods)

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

UNIT–V: PATENTS **(07 Periods)**

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

Total Periods: 30

Textbooks:

T1. Stuart Melville and Wayne Goddard, Research Methodology: An introduction for Science & Engineering students, Juta and Company Ltd, 2004

T2. Catherine J. Holland, Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets, Entrepreneur Press, 2007.

References Books:

R1. Cooper Donald R, Schindler Pamela S and Sharma JK, Business Research Methods, Tata McGraw Hill Education, 2012, Eleventh Edition,

R2. David Hunt, Long Nguyen, Matthew Rodgers, Research Methodology: A Step-by-Step Guide for Beginners, Wiley, 2007.

R3. Deborah E. Bouchoux, Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets, Cengage, 2024, Sixth Edition,

R4. Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, The Craft of Research, University of Chicago Press, 2024, Fifth Edition.

R5. Professional Programme Intellectual Property Rights, Law and practice, The Institute of Company Secretaries of India, Statutory body under an Act of parliament, September, 2013.

Web Resources:

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

2599181	M.Tech., I-SEMESTER ENGLISH FOR RESEARCH PAPER WRITING (Common to AIDS, PS, Geo-Tech, RE, ES&VLSI) (AUDIT COURSE-I)	L	T	P	C
		2	0	0	2

COURSEOUTCOMES:

After completion of the course, student will be able to

CO1. Demonstrate proficiency in academic English by applying MAP principles, using clear, precise, and objective language, structuring coherent paragraphs, integrating references, and employing paraphrasing and appropriate tone in writing.

CO2. Exhibit critical reading skills to analyze academic texts, differentiate between article types, identify arguments and methodologies, evaluate findings, and make effective notes.

CO3. Apply advanced grammar and punctuation to construct clear, accurate, and complex sentences with proper voice, tense consistency, subject-verb agreement, and unambiguous references.

CO4. Revise and refine written work by editing for clarity, coherence, and grammar; proofread for accuracy; and apply effective strategies for professional correspondence and creative writing.

CO5. Demonstrate digital literacy by critically evaluating online content, using AI tools ethically in research writing, generating accurate citations, and practicing plagiarism-free writing with awareness of fair practices.

SYLLABUS:

UNIT-I: FUNDAMENTALS OF ACADEMIC ENGLISH (05 Periods)

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: READING SKILLS FOR RESEARCHERS (06 Periods)

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:GRAMMAR REFINEMENT FOR RESEARCH WRITING (06 Periods)

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: MASTERY IN REFINING WRITTEN CONTENT/EDITING SKILLS

(07 Periods)

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.

UNIT-V: TECHNOLOGY AND LANGUAGE FOR RESEARCH (06 Periods)

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

Total Periods: 30

Textbooks:

T1. Routledge, Bailey. S. Academic Writing: A Handbook for International Students. London and New York: 2015.

T2. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

Reference books:

R1. Craswell, G., Writing for Academic Success, Sage Publications, 2004.

R2. Peter Elbow, Writing With Power, E-book, Oxford University Press, 2007

R3. Oshima, A. & Hogue, A., Writing Academic English, Addison-Wesley, New York, 2005

R4. Swales, J. & C. Feak, Academic Writing for Graduate Students: Essential Skills and Tasks, Michigan University Press, 2012.

R5. Goldbort R., Writing for Science, Yale University Press (available on Google Books), 2006

R6. Day R., How to Write and Publish a Scientific Paper, Cambridge University Press, 2006

Web Resources:

1. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-ge04/
2. https://onlinecourses.swayam2.ac.in/ntr24_ed15/preview
3. "Writing in the Sciences" – Stanford University (MOOC on Coursera)
   https://www.coursera.org/learn/sciwrite
4. Academic Phrasebank – University of Manchester
   http://www.phrasebank.manchester.ac.uk
5. OWL (Online Writing Lab) – Purdue University,
   https://owl.purdue.edu
   (Resources on APA/MLA formats, grammar, structure, paraphrasing)
6. Zotero or Mendeley (Reference Management Tools) – Useful for managing citations and sources.

2512181	M.Tech., I-SEMESTER DISASTER MANAGEMENT (Common to AIDS, PS, Geo-Tech, RE, ES&VLSI) (AUDIT COURSE - I)	L	T	P	C
		2	0	0	2

Pre-Requisites: Nil

COURSE OUT COMES:

After completion of the course, student will be able to

CO1. Identify and map disaster-prone areas and understand the epidemiological consequences of disasters.

CO2. Define and distinguish between hazards and disasters, and explain their types, nature, and impacts.

CO3. Assess the economic, social, and ecological repercussions of major natural and man-made disasters.

CO4. Apply risk assessment methods and propose disaster risk reduction strategies at local, national, and global levels.

CO5. Demonstrate knowledge of disaster preparedness tools such as remote sensing, meteorological data, risk evaluation, and community awareness.

SYLLABUS:

UNIT–I: INTRODUCTION (06 Periods)

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: REPERCUSSIONS OF DISASTERS AND HAZARDS (06 Periods)

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: DISASTER PREPAREDNESS AND MANAGEMENT (06 Periods)

Preparedness - Monitoring of Phenomena - Triggering a Disaster or Hazard - Evaluation of Risk-Application of Remote Sensing - Data from Meteorological and Other Agencies -Media Reports-Governmental and Community Preparedness

UNIT-IV: RISK ASSESSMENT (06 Periods)

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 Risk Assessment – Strategies for Survival

UNIT-V: DISASTER MITIGATION (06 Periods)

Meaning, Concept and Strategies of Disaster Mitigation – Emerging Trendsin Mitigation - Structural Mitigation and Non- Structural Mitigation - Programs of Disaster Mitigation in India

Total Periods: 30

Textbooks:

T1. Gupta, H. K, *Disaster Management,* Universities Press, 2003
T2. Singh, R. B., *Natural Hazards and Disaster Management,* Rawat Publications, 2006.

Reference Books:

R1. Coppola, D. P., *Introduction to International Disaster Management,* Elsevier, 4th ed., 2020.
R2. Shaw, R., & Izumi, T., *Science and Technology in Disaster Risk Reduction in Asia,* Springer, 2022.
R3. Wisner, B., Gaillard, J. C., & Kelman, I., *Handbook of Hazards and Disaster Risk Reduction and Management*, Routledge, 2nd ed., 2021.
R4. Saini, V. K., *Disaster Management in India: Policy, Issues and Perspectives,* Sage India, 2021.
R5. Kelman, I., *Disaster by Choice: How Our Actions Turn Natural Hazards into Catastrophes,* Oxford University Press, 2022
R6. Sahni, P. &Dhameja, A., *Disaster Mitigation: Experiences and Reflections,* Prentice Hall of India, 2004.

Web Resources:

1. https://ndma.gov.in – official guidelines, reports, and policy frameworks.
2. https://www.undrr.org – Sendai Framework, global risk reduction strategies.
3. https://www.gdacs.org – real-time disaster alerts
4. https://www.undrr.org – Sendai Framework, global risk reduction strategies.

		L	T	P	C
2598181	**M.Tech., I-SEMESTER** **ESSENCE OF** **INDIAN TRADITIONAL KNOWLEDGE** (Common to AIDS, PS, Geo-Tech, RE, ES&VLSI) **(AUDIT COURSE - I)**	**2**	**0**	**0**	**2**

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1. Illustrate traditional knowledge, its nature, characteristics, and scope

CO2. Demonstrate the need for protecting traditional knowledge and its significance in the global economy

CO3. Explain the legal framework and policies related to traditional knowledge protection

CO4. Apply traditional knowledge in different sectors, such as engineering, medicine, agriculture, and biotechnology

CO5. Analyze the importance of traditional knowledge in various contexts, including its historical impact and social change, relationship between traditional knowledge and intellectual property rights, including patents and non-IPR mechanisms

SYLLABUS:

UNIT-I:INTRODUCTION TO TRADITIONAL KNOWLEDGE (06 Periods)

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

UNIT-II: PROTECTION OF TRADITIONAL KNOWLEDGE (06 Periods)

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

UNIT-III: **LEGAL FRAME WORK AND TRADITIONAL KNOWLEDGE (06 Periods)**

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) –
The Biological Diversity Act 2002 and Rules 2004 - the protection of traditional knowledge bill, 2016 Geographical Indicators Act 2003.

UNIT-IV: TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY

(06 Periods)

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.

UNIT-V: TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS (06 Periods)

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

Total Periods: 30

Textbooks:

T1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning Pvt. Ltd. Delhi, 2022 1st Edition.

T2. Basanta Kumar Mohanta and Vipin Kumar Singh, Traditional Knowledge System and Technology in India, Pratibha Prakashan 2012 1st Edition.

Reference Books

R1. Samskrita Bharati, Pride of India: A Glimpse into India's Scientific Heritage, New Delhi 2006.

R2. Kak, S.C. "On Astronomy in Ancient India", Indian Journal of History of Science, 22(3), 1987

R3. Subbarayappa, B.V. and Sarma, K.V. Indian Astronomy: A Source Book, Nehru Centre, Mumbai, 1985.

R4. Bag, A.K. History of Technology in India, Vol. I, Indian National Science Academy, New Delhi, 1997.

R5. Acarya, P.K. Indian Architecture, Munshiram Manoharlal Publishers, New Delhi, 1996.

R6. Banerjea, P. Public Administration in Ancient India, Macmillan, London, 1961.

R7. Kapoor Kapil, Singh Avadhesh, Indian Knowledge Systems Vol – I & II, Indian Institute of Advanced Study, Shimla, H.P., 2022

Web Resources:

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/12110600

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