



Sri Ramakrishna Institute of Technology

[Educational Service : SNR Sons Charitable Trust]

[Autonomous Institution, Reaccredited by NAAC with 'A' Grade]

[Approved by AICTE New Delhi, Permanently Affiliated to Anna University, Chennai]



REGULATIONS 2025

Outcome based learning through choice based credit system
(For UG students admitted from 2025-2026 and onwards)



Curriculum & Syllabus

Website: sritcbe.ac.in



REGULATIONS 2025

Information on the minimum number of Credits to be earned for
the successful completion of B.E./B.Tech. Programs for

- **Regular candidates (4 Years) : 162 credits**
- **Lateral Entry candidates (3 Years) : 120 credits**

Chairperson, Academic Council/Principal



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VISION AND MISSION OF THE INSTITUTION



VISION

Our Vision is to develop into a world-class technological Institute with centers of excellence in various disciplines by providing quality and value-based education with continuous upgradation of infrastructure, human resources and teaching - learning process.



MISSION

Our Mission is to produce Quality Engineers, Scientists and Managers equipped with unbounded technical skills, domain knowledge and excellent moral values, for the advancement of the industry, business and for the emancipation of society.



Sri Ramakrishna Institute of Technology was established in the year 2002 by SNR Sons Charitable Trust. It is an Autonomous Institution since 2017 and reaccredited by NAAC with 'A' Grade. The Institution offers 6 Undergraduate Programs and 3 Post Graduate Programs in Engineering and Technology. The B.E. Electronics and Communication Engineering and B.Tech. Information Technology Programs have been accredited by the NBA.

HIGHLIGHTS OF THE CURRICULUM

- Outcome based education with student-centric learning through Choice Based Credit System
- Industry driven learning with a multi-disciplinary approach
- Project-based learning
- Competency enhancement courses including on-line learning
- Collaborations with Premier Institutions–National and International
- Certification courses in foreign languages
- One credit course offered by Industries and Research establishments
- Employability enhancement courses focusing on placements
- Industry Internship opportunities
- Inculcation of Innovation, startup culture and Entrepreneurship development
- Syllabi development based on emerging technologies
- Implementation of active learning methods.
- Periodic program outcome review within the broad framework of the agreed-upon expected graduate attributes
- Provision for specialization and Minor certification



REGULATIONS 2025

For all B.E. / B.Tech. Full-Time Program

(For the students admitted to B.E. / B.Tech. Program from the Academic year 2025-2026 and onwards)

PREAMBLE

Sri Ramakrishna Institute of Technology with a focused vision and mission of imparting quality technical education in domain knowledge, both theory and practice application is gearing up for several initiatives towards academic excellence and quality improvement. In view of this the Outcome based Education through Choice-Based Credit System (CBCS) is being introduced from the Academic year 2025-2026, to strengthen interdisciplinary and multidisciplinary approach with advances in learner-centric program and lifelong learning opportunities, with enriched and flexible contents. The industry interaction initiative provides a meaningful linkage between the challenging professional world and the academia. The programs are designed to integrate science, engineering and technology and human value along with liberal arts for the graduates of the various program to function efficiently and effectively in the technological society.

The proposed academic structure under the Outcome based education through Choice Based Credit System shall enable innovations, preparing the students to work as a team and face the professional challenges through learning additional courses as specialization /minor courses. The proposed system creates ample environment for self-learning, innovation leading to a startup culture and Entrepreneurship development.

SCOPE

The regulations provided herein shall apply to all Regular, Professional and General Undergraduate (UG) program offered in SRIT.

These regulations are comprehensive and include definitions of key terms, critical concepts, mechanics of calculations, role of various boards and committees and the evaluation system.

1. PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise specifies:

1. **Program** means undergraduate degree program. B.E. / B.Tech. Degree Program
2. **Discipline** means discipline of B.E. / B.Tech. Degree Program, like Mechanical Engineering, Information Technology, etc.
3. **Course** means a Theory / Integrated or Practical course that is studied in a semester, like Engineering Graphics, Fundamentals of Computing and Programming, etc...
4. **Head of the Institution** means the Principal of the College /Institution
5. **Head of the Department** refers Head of the Department concerned and
6. **University** means affiliated University, currently, Anna University Chennai

2. ADMISSION CRITERIA

The Admission Criteria for all Program will be as per the norms of the Directorate of Technical Education and the Affiliating University.

Lateral Entry Candidates

- i. The candidates who possess the Diploma in Engineering / Technology awarded by the State Board of Technical Education, Tamil Nadu or its equivalent are eligible to apply for admission to the third semester of B.E. / B.Tech. Program corresponding to the branch of study.
- (OR)**
- ii. The candidates who possess the Degree in Science (B.Sc.) (10+2+3 stream) with mathematics as a course at the B.Sc. level are eligible to apply for admission to the third semester of B.E. / B.Tech. Such candidates shall undergo two additional engineering courses in the third or fifth and fourth or sixth semesters respectively as prescribed by the respective Chairman of Board of Studies.

3. DURATION OF THE PROGRAM

The four academic years will be divided into eight semesters with two semesters per academic year. Each semester shall normally consist of 90 working days including examination days.

Degree	Stipulated number of Semesters	Permitted number of Semesters
B.E. /B.Tech. (Regular)	8	14
B.E. /B.Tech. (Lateral)	6	12

The permitted number of Semesters can be increased on a case to case basis subject to the approval of the Academic Council and the affiliating university.

The total period for completing the Program is reckoned from the commencement of the first semester of the Program to which the candidate is admitted and it shall not exceed the maximum period specified irrespective of the period in break of study that he/she may be eligible for the award of the degree.

The ongoing degree program in Bachelor of Engineering / Technology are given below:-

B.E. Computer Science and Engineering

B.E. Electronics and Communication Engineering

B.E. Electrical and Electronics Engineering

B.E. Mechanical Engineering

B.Tech. Information Technology

B.Tech. Artificial Intelligence and Data Science

The ongoing degree Postgraduate Programs of study

M.E. Communication Systems

M.E. Computer Science and Engineering

M.E. Power Systems Engineering

4. STRUCTURE OF THE PROGRAM

The Curriculum and Syllabi under Regulations 2025 are implemented based on the recommendations of Model Curriculum by AICTE and UGC, New Delhi and Anna University Chennai with a view of achieving excellence in the quality of education by keeping the requirements of enhancing the employability Skill and producing well-rounded engineers for the benefit of Industry, Society and Nation as a whole.

The outcome-based learning through CBCS enables the students to earn credits across programs and provides flexibility for slow and fast learners in registering the required number of credits in a semester. The CBCS facilitates the transfer of credits earned in different departments/ Centers of other recognized / accredited universities or institutions of higher education in India and abroad either by studying directly or by online method.

The curriculum of every program is designed with a minimum number of credits to be earned, to be eligible for the award to degree 162 (**120** for lateral entry) must be completed.

5. CATEGORIZATION OF COURSES

Every B.E./B.Tech. Program will have a curriculum with syllabi consisting of theory/integrated and practical courses that shall be categorized as follows:

Category of Course	Description	Credits
Humanities and Social Sciences, including Management courses [HSMC]	Courses include Technical English, Employability Skills, Engineering Ethics and Human Values, Communication skills and Management courses	10-12
Basic Science courses [BSC]	Courses include Chemistry, Physics, Biology and Mathematics	16-18
Engineering Science courses including workshop drawing, basics of electrical /mechanical/ computer, etc. [ESC]	Courses include Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Civil / Computer / Instrumentation Engineering	20-22
Professional core courses [PCC]	Courses include the core courses relevant to the chosen PROGRAM of study	56-60
Professional Elective courses relevant to chosen specialization/branch [PEC]	Courses include. Elective courses relevant to the chosen PROGRAM of study.	18
Open subjects – Electives from other technical and /or emerging subjects [OPC]	Courses include inter-disciplinary courses which are offered in other Engineering/Technology program of study.	06
Internship cum Project work [IPW]	Courses include experiential learning courses such as Project, Seminar and In-plant training / Internship to improve Employability Skills	12
Emerging Technology courses [ETC]	Courses include a wider perspective by integrating knowledge from various disciplines fostering a more holistic understanding of complex issues. Computer science, data science, or even the arts and humanities.	06
Ability Enhancement Courses [AEC]	Courses include Aptitude, mindset, soft skills, employment readiness & entrepreneurship.	04
Skill Enhancement Courses / Skill Development Courses [SDC]	Courses include skill development courses like computational thinking, Design thinking, and Makerspace.	04
Liberal Arts Courses [LAC]	Courses help students develop essential soft skills such as communication, teamwork, and leadership, which are highly valued by employee.	04
Mandatory Courses [MC]	Courses include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc.	Non-Credited
		162

- The Curriculum of a semester shall normally have a blend of 5 or 6 theory /integrated and laboratory courses.
- Employability Enhancement Course(s) may also be included. Credit will be assigned to each course.
- However, the total number of courses per semester shall not exceed 8/9 (including EEC).
- The medium of instruction is English for all courses.

Each course is assigned certain number of credits based on the following:

Contact period per week	Credits
1 Lecture Period/week	1
1 Tutorial Period/week	1
2/3 Practical Periods/week (Laboratory / Seminar / Project Work / etc.)	1

6. INDUCTION PROGRAM

- 6.1 All students shall undergo induction program in the first semester for duration as per the guidelines of All India Council for Technical Education (AICTE).
- 6.2 All student have to attend and complete the induction program.

7. COURSE ENROLLMENT AND REGISTRATION

- 7.1 Each student, on admission, shall be assigned to a student faculty advisor who shall advice and counsel the student about the details of the academic program and the choice of courses considering the students' academic background and career objectives.
- 7.2 Every student shall enroll for the course of the succeeding semester in the current semester. However, the student shall confirm the enrollment by registering for the courses within the first five working days after the commencement of the concerned semester.
- 7.3 No course shall be offered by a department unless a minimum of 15 students register for that course.
- 7.4 After registering for a course, a student shall attend the classes, satisfy the attendance requirements for that course, earn Continuous Assessment Marks and appear for the Semester-end examinations.
- 7.5 Each student on admission shall register for all the courses prescribed in the curriculum in the student's First Semester of study.
- 7.6 The enrollment for the courses of the semesters 2 to 8 will commence 10 working days prior to the last working day of the preceding semester. The student shall enroll for the courses with the guidance of the student's Faculty Advisor.
- 7.7 The curriculum for any semester except for final semester usually carry credits between 21 and 25.

8. DIRECT SELF STUDY ELECTIVE COURSES

- 8.1 All B.E. / B.Tech. degree PROGRAM candidates who have earned a CGPA of 8.00 and above and who have no standing backlogs will be eligible to take one elective course as Self Study course, which may be either an Open Elective or a Professional Elective by getting prior approval from the HoD who will nominate a faculty for the periodic monitoring and continuous evaluation of the course.
- 8.2 Such candidates who successfully cleared the direct self-study elective course in the 4th /5th and 6th semesters of their PROGRAM of study will be eligible for project work/internship only during their final year of study if they complete all their course work requirements.
- 8.3 The Direct Self-study elective course is limited to one course per semester from the 4th semester onwards. The candidate has to register with the office of the Controller of Examinations through the Academic Coordinator & Head of the Department within the first 15 working days of the respective semesters.
- 8.4 The grade for the course will be based on the continuous assessment by the mentor and the performance of the candidate in the semester-end examinations.
- 8.5 The maximum number of credits that can be earned as direct self-study is NINE.**

9. OPEN ELECTIVE COURSES

- 9.1 Open Elective courses include the elective courses relevant to the chosen discipline which a candidate can choose from the curriculum of other B.E./B.Tech. Programs and elective courses offered by the departments under the faculty of Science and Humanities.
- 9.2 Open elective courses generally will not require any pre-requisite course of that program.

Please note the following when selecting your open elective/s:

- Some open elective courses may not be appropriate as an open course for a particular degree program. Example: Business Degree courses are not considered open for students in a business degree program.
- Some open elective courses may not be offered in the current academic semester or year.

- Some open elective courses may reach capacity early and therefore space may not be available for all interested students.
- Therefore, students who enroll early are most likely to get their choice.
- Students are responsible for ensuring that they successfully complete all courses as required by the program design to graduate.

10. GLOBAL INITIATIVE OF ACADEMIC NETWORKS (GIAN)

10.1 Two weeks/Ten days courses offered under the Global Initiative of Academic Networks (GIAN) program of MHRD conducted at premier institutes, can be **considered instead of one elective course**.

11. ONE CREDIT COURSES

11.1 Candidates can also opt for one credit industry oriented courses of 15 to 20 hours duration, which will be offered by experts from industry/ other institution of eminence /faculty from premier institutions on specialized topics.

11.2 Candidates can complete such one credit courses during the semesters 3 to 7 as and when these courses are offered by different departments.

11.3 A candidate will also be permitted to register for the one credit courses of other departments provided the candidate has fulfilled the necessary pre-requisites (if any required) of the course being offered - subject to approval by both the Heads of the Departments.

11.4 One credit course will be evaluated by the course instructor/department faculty concerned. A total of 100 marks will be assessed by continuous assessment only, of which 75% weightage will be for final test to be scheduled by the course instructor/department faculty concerned.

11.5 The Head of the Department may identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, faculty handling the course (if available), coordinator and a senior faculty member nominated by the Head of the Department shall monitor the evaluation process.

11.6 The marks will be awarded to the candidate by the above committee based on their performance.

11.7 The additional grades earned by the candidates for the one credit courses which is not opted for conversion into an elective(s) will not be included in the computation of CGPA.

12. INDUSTRIAL TRAINING/ INTERNSHIP

12.1 If Industrial Training is not prescribed in the curriculum, the student may undergo Industrial Training optionally, and the credits earned will be indicated in the Grade Sheet.

12.2 In case of Internship the training needs to be undergone continuously from one organization preferably.

12.3 The student is allowed to undergo a maximum of 6 weeks Industrial Training for Internship during the entire duration of study.

12.4 At the end of the Internship training the candidate should submit the report and certificate from the organization where he / she underwent the training.

12.5 Evaluation of the Industrial/Internship training will be done based on the report and Viva-Voce examination conducted internally by a department committee constituted by the Head of the department.

12.6 The institution shall monitor the student internship program. The internship report of each student shall be submitted to the Head of the Department of the college with the approval of the Guide.

12.7 One Week = 40 Internship Hours.

Duration of Training	Credits
2/3 Weeks	1
4/6 Weeks	2

13. TRANSFER OF CREDITS THROUGH ONLINE COURSES

13.1 Within the broad frame work of the SRIT learning outcome based curriculum frame work through choice based credit system Regulations 2025 , and on the recommendation of the concerned Chair Person of the Board of studies and the Chairperson of the Academic Council, students may be permitted to earn part of the credit requirements for professional and open elective courses from other approved Institutes of repute and status in the country /abroad or online learning courses of SWAYAM* platform under UGC during their period of study>(*Credit Frame work for online learning courses through SWAYAM Regulation 2016).

13.2 The Credits earned by such credit transferred courses shall be limited to a maximum of nine credits for Professional and Open elective courses only.

THE GUIDELINES FOR THE TRANSFER OF CREDITS ARE AS FOLLOWS:

- The Online Course shall be a credited course and is taught for at least one semester.
- Students with consistent academic performance (having a **CGPA of 8.00** or above and no backlogs) shall opt for credit transfer courses through online mode of learning with recommendation of the Chairperson of the Board of studies and the approval of the Chairperson of Academic Council.
- The Board of studies of the department shall evaluate the credit transfer course with respect to the course contents, number of contact hours, course evaluation system, and approval or acceptance letter from the other institutions/Online courses and decide the Equivalent Elective Course(s) in their respective department curriculum and the number of equivalent credits the student earns for the course.
- The candidate undergoing online course needs to receive a certification for the earned credits.
- The Chairperson of the Board of studies shall issue a Credit Transfer Certificate mentioning in it the details of equivalent Courses, corresponding Credits and Equivalent Grades for the credit transferred courses. The complete details will then be forwarded to the Chairperson, Academic Council for approval.
- Credits and the Grades earned by the student under this Credit Transfer scheme will be reflected in the corresponding Semester Grade Card and Consolidated Grade Card issued by the institution by entering the Equivalent Grades for the credit transferred courses.

Skill Enhancement Courses

Skill Enhancement Course or Skill Development Courses (SDC) are the courses offered to enhance specific abilities and competencies of the students in both academic and professional contexts. These courses are designed to impart practical skills, including hands-on training, internships, and soft skills, to improve employability.

Ability Enhancement Courses:

Ability Enhancement Courses (AEC) are part of the curriculum, often include language courses and other analytical skill development programs, to enhance employability and personal development.

Emerging Technology Courses:

A minor provides students with an opportunity to explore subjects outside their chosen major in emerging technologies, offering a more well-rounded education.

14. B.E/B.TECH. WITH HONORS/ DEGREE WITH A MINOR

14.1 Award of UG (Hons),UG with Minor will be implemented as approved by Anna University, Chennai for the UG students who have joined from the Academic Year 2021 – 2022 and onwards.

B.E. / B.Tech. (Honors)

B.E. / B.Tech. (Minor)

14.2 All branches of Engineering and Technology shall offer elective courses in the emerging areas like Artificial Intelligence (AI), Internet of Things (IoT), Blockchain, Robotics, Quantum Computing, Data Sciences, Cyber Security, 3D Printing and Design, Augmented Reality/ Virtual Reality (AR/VR).

14.3 Additional courses in Emerging Areas shall be allowed from the same discipline of study is called specialization.

14.4 Additional Courses may be allowed where a student of another discipline of study is called a Minor.

14.5 The students' eligibility norms for taking up Honors/Minor degree courses will be as per the Anna University, Chennai guidelines.

14.6 The minimum number of Additional Credits to be earned for the award of Honors/Minor degree is 18 credits, over and above the credits required for the award of Undergraduate degree as suggested in the AICTE Model Curriculum and Anna University.

14.7 The candidate will be permitted to take up B.E/B.Tech. Honors/Minor degree courses from the IV/V semester onwards. The eligibility criteria will be the (N-1)th semester performance. **(CGPA 7.5 and above and cleared all courses in the first attempt).**

14.8 Six credits may be earned by the candidate through online mode (NPTEL platform) out of these 18 credits.

14.9 If a candidate decides not to opt for Honors, after completing certain number of additional courses, the additional courses studied shall be considered in place of the professional elective courses which are part of the curriculum. If the candidate has studied more number of such courses than the number of professional elective courses required as per the curriculum, the courses with higher grades shall be considered for the calculation of CGPA, the other courses shall be printed in the grade sheet, however will not be considered for the calculation of CGPA.

14.10 If a candidate decides not to opt for Minors, after completing a certain number of additional courses, the additional courses studied shall be considered in place of the open elective courses which are part of the curriculum. If the candidate has studied more number of such courses with higher grades shall be considered for the calculation of CGPA; the other courses shall not be considered for the calculation of CGPA.

14.11 The course requirements for specialization/Minor degree are to be completed before the commencement of the final semester of study.

S.No.	Engineering Program of Study	Name of the Specialization	Permitted to Offer
1	Mechanical Engineering	Electric Vehicles	Specialization
2	Electrical & Electronics Engineering	Electric Vehicles	Specialization
3	Electronics & Communication Engineering	Internet of Things (IoT)	Specialization
4	Computer Science & Engineering	Virtual & Augmented Reality	Specialization
5	Information Technology	Cyber Security	Specialization
6	Artificial Intelligence & Data Science	Cloud Computing	Specialization

15. GAP YEAR -CONCEPT OF STUDENT ENTREPRENEURSHIP

15.1 The committee with the Principal as the chairman, an external member (preferably from industry), two internal members and respective HODs as the member secretary, will evaluate the students who are involved in entrepreneurship activities.

15.2 A gap year is permitted to the students to take a year break to work on their start-ups and resume academics to complete the degree requirements.

15.3 The GAP year ranges from 8 months to a maximum period of one year.

15.4 The student who is interested in availing of a GAP year, shall apply the same after the publication of the results of IV/VI semester.

15.5 The committee shall ascertain the modalities and parameters to recognize a specific student as “Outstanding” for granting gap period for the purpose of pursuing entrepreneurship in residence (or) working on a “Startup Idea” at the college level.

15.6 The Classification of the degree will not be affected for those students who have availed the gap year facility to pursue the entrepreneurship activities subject to the fulfillment of all conditions stipulated in the academic regulations for the award of the degree.

Candidates shall pursue entrepreneurship activities during their program of study with a break of one year.

15.8 After the gap year facility is given, and an appraisal process by an incubator where the student is attached, the student must ensure continuity of curriculum and syllabus at the time of joining back.

15.9 Student entrepreneurs working on a start-up idea during gap year of the college may be permitted to convert their start-up project and submit the same as their final year project work towards the completion of the degree program.

15.10 Eligibility Criteria:

- The student applying for GAP year should have secured a first class.
- The student must have participated / won prizes in the national level contests organized by Govt. agencies such as UGC, AICTE, MHRD, DRDO, etc./ leading corporates / Institution of Eminence (IITs/IIM/IISC/NITs, etc.) to secure the Institutional seed funding for Proof of Concept (PoC) setup.
- The student must submit a basic PoC with a minimal validation along with the application for the GAP year.
- A review committee will be constituted comprising of the Principal – Convenor, HOD of the Student Department, Internal Members from SRIT HIVE, NISP and EDC.
- The decision will be taken by the committee as per the rubrics tabulated below

Hackathons (Max.25)		MHRD IIC/EDC (Max.25)		Funding (Max.10)	
Phase	Points	Phase	Points	Phase	Points
Won	10	Won	5	Applied	2
Final Round	10	Participation	5		
Participation	5	Ideation (In-house through MHRD-IIC)	5	Funds Received	8
		B-Plan	10		

- Monthly Review will be conducted for the first six months. For the next six months, review will be conducted once in 45 working days.
- At the end of the Gap Year the student must have converted the idea into a new product and ensure the validity for Commercialization/Technology Transfer.
- The student can be allowed to avail Gap Year in the Third/Fourth year of his/her study.
- If III Year is availed as Gap Year by the student, he/she may be permitted to sit with the juniors to study the Third Year Courses and take the Final Year (Fourth Year) courses as Self – Study (if eligible).
- If IV Year is availed, he/she may be permitted to complete the Fourth Year Courses as Self – Study during the III Year itself (if eligible).

16. LIVE-IN-LAB

16.1 It is an experiential learning program for the students to understand the problems of the population living in rural areas and to identify projects to address the problems, develop solutions, put into practice, assess results and provide an innovative multidisciplinary solutions for the betterment of rural people and rural economy.

16.2 The interested students shall go to the village adopted by the institution from the second year onwards, and they have to stay at least for two weeks continuously in that village.

16.3 During the stay, they can interact with the village population and identify the problem. Further, they have to provide a solution to the problems identified at the end of the period of study to be considered as an internship.

16.4 HIVE Convenor and Head of the department should ensure that all the necessary arrangements are made in this regard.

16.5 At the end of the study, students must report to the respective department, submit a report as a group consisting of a maximum of 6 numbers detailing the visit. The report should include the date of visit, questionnaires prepared for the problem identification, justification and the suggestions/solutions provided for the identified problem. Photo proof is essential for all activities.

16.6 The report will be evaluated by a committee constituted with the approval of the Principal as per the procedure formulated for the evaluation of the project.

16.7 All such projects will be considered as Internship/Field training.

ASSESSMENT FOR LIVE – IN – LAB

Review I

Assessment	Marks
Workshop (Group Participation) –Training	15
Village Visit- Reports	15
Problem Identification and Ideation	35
Poster Presentation	10
Paper Submission review/Report	25
Total	100

Review II

Assessment	Marks
Proposed Implementation with HIVE-SRIT Presentation	10
Proposal Submission + Review	10
Prototype Design	20
Implementation	35
Final Report and Proof of Concept	25
Research Paper Publications/ Product	10
Total	100 + 10

17. STUDENT EXCHANGE SCHEME IN APPROVED FOREIGN UNIVERSITIES

17.1 Students who complete a part of the academic program either one or two semesters under the student exchange scheme in approved foreign Universities, the transfer of credits of equivalent courses completed by them in the foreign university will be approved.

17.2 The remaining courses of the respective semester(s) which they have not studied in the respective regulation, they shall register for those courses within the next two or subsequent semesters on a self-study basis.

17.3 Such an appearance of the student in those courses will be treated as first appearance for the purpose of classification.

17.4 The certificate of successful completion of International Mobility Program for a period of 2 weeks in an approved foreign university shall be considered as internship/industrial training under Internship Project work.

18. REAPPEARANCE REGISTRATION

18.1 The maximum number of credits the candidate can register in particular semester cannot exceed 36 credits excluding laboratory courses.

18.2 Choice of reappearance course in registration will be permitted only for candidates who have more than 36 credits excluding practical courses in the current semester of study. A candidate who has to register for less than 36 credits excluding practical courses during the current semester of study shall appear for all courses.

18.3 If a candidate who fails to secure a pass/ is absent for the end semester examination in a theory course (except electives), the student shall do reappearance registration for that course in the subsequent semester/when offered next.

18.4 If a candidate is prevented from writing end semester examination of a course due to lack of attendance the candidate has to register for the course again in the subsequent semester/when offered next, attend the classes and fulfill the attendance requirements and earn continuous assessment marks for that course.

18.5 If the course, in which the student has failed/prevented from writing end semester examination due to lack of attendance, is a professional elective or an open elective, the student may be permitted to do reappearance registration for that course in the subsequent semester. (OR) Register for any other professional elective or open elective course in the subsequent semesters, attend the classes and fulfill the attendance and continuous assessment requirements.

18.6 A student who after having earned necessary attendance, has failed in any course like In-plant Training, Field training/Internship (or) in any course carrying only Continuous Assessment marks will register for the examinations when it is conducted next time and will be declared to have passed the examination if He/She secures 50% marks in the prescribed end semester Examinations alone.

18.7 A student who has earned necessary attendance in the course Project work/Mini Project but does not submit the report on Project work on or before the date specified by the department/college /whose project report is not accepted for reasons of incompleteness or other serious deficiencies/ could not appear for the semester end examination on the

scheduled date, or failed to secure a pass he/she shall be deemed to have failed in the Project work and awarded grade U and will have to register for the same at the beginning of the subsequent semester, redo and submit the Mini Project/project report at the end of that semester and appear for the final examination, the Continuous Assessment mark earned afresh.

18.8 A student, after registering for a course, may withdraw his / her registration between the first and second Continuous Assessment Test on valid reasons and complete the registration process with the approval of the Faculty Advisor. The total number of credits of such dropped courses cannot exceed 6.

19. ATTENDANCE REQUIREMENTS FOR APPEARING FOR THE SEMESTER END EXAMINATION OF A COURSE

A candidate who has fulfilled the following conditions shall be deemed to have satisfied the attendance requirements for the completion of a semester:

19.1 Every candidate is expected to attend all classes and secure 100% attendance.

19.2 Candidates who secure, less than 65% of overall attendance will not be permitted to appear for the End Semester Examinations. The Candidate shall seek readmission to the same semester in the subsequent academic year.

19.3 A candidate must secure not less than 75% of attendance (after rounding off to the nearest integer), course-wise taking into account the total number of periods required for that course as specified in the curriculum.

19.4 The maximum limit of duty leave exemption to a candidate during a semester shall be limited to 10% of the required attendance in that course. This duty leave is for representation in University/Inter University/ State / National/ sports events, Co-Curricular activities, paper and/or project presentation with prior permission from the head of the Institution based on the recommendation of the Head of the Department, provided the progress and conduct of the candidate is satisfactory.

19.5 If a candidate secures attendance between 65% and 75% in any course in the current semester due to medical reasons (hospitalization/accident/specific illness) he/she may be given an condonation (due to medical reasons only) to appear for the current semester examinations in that course, subject to the condition that the candidate should submit, the medical certificate approved by the Head of the Institution based on the recommendation of the Head of the Department on the day of resuming to college, after availing leave on medical reason.

19.6 Candidates who secure, less than 65% of attendance in any course will not be permitted to appear for the Semester End Examinations of that course. The candidate has to re-register and repeat that course in the subsequent semester/ when offered next.

19.7 Students maintaining a CGPA ≥ 9.00 and SGPA ≥ 9.00 in the latest completed semester may avail a waiver for attendance in the following semester in any course. Students who avails the attendance waiver will be awarded the marks based on their performance in an advanced assignment specified by the course coordinator (in emerging topics related to the course). The candidate can appear in all assessments and evaluation components without being marked ineligible due to attendance-based regulations.

20. ASSESSMENT PROCEDURES FOR AWARDING MARKS

- All B.E./B.Tech. Programs consist of Theory Courses, Laboratory Courses, Theory integrated with laboratory, and Employability Enhancement Courses.
- Appearance in the Semester End Examination is mandatory for all courses, including Theory, Laboratory and Project work.
- Performance in each course of study shall be evaluated based on
 - ✓ Continuous assessments throughout the semester
 - ✓ Semester End Examination at the end of the semester

20.1 MARKS WEIGHTAGE FOR DIFFERENT COURSES:

S.No.	Category of course	Continuous Assessments Marks	Semester End Examinations Marks
1	Theory Courses	40	60
2	Laboratory Courses	60	40
3	Theory cum Laboratory Course	50	50
4	Project Work	60	40
5	All other Courses	100	--

- The Semester End Examinations for theory courses will be of 3 hours duration and shall normally be conducted between October and December during the odd semesters and between April and June during the even semesters.
- Semester End Examination is a mandatory requirement for passing the course having an external component, and every candidate should appear for the examination for theory, theory cum laboratory, laboratory courses and project work.
- In case a student is unable to attend the continuous assessment due to medical reasons (hospitalization / accident/ specific illness) or due to participation in the College / University / State / National / Sports events with prior permission from the Head of the Department, a Reassessment may be given at the end of the semester after getting approval from the Principal through the Head of the Department and the concerned course instructor.

20.2 CONTINUOUS ASSESSMENT FOR THEORY COURSE

Assessment	Continuous Assessment weightage 40%		End Semester Examinations weightage 60%
	Duration	Weightage	
Semester in Exam - I	120 min	12.5	
Semester in Exam - II	120 min	12.5	
Surprise Test/Open Book Test (A1)	-----	5	
Surprise Quiz(A2) (minimum 2 Quiz through Online mode)	-----	5	
Assessment by Course Instructor (A3)	-----	5	

20.3 CONTINUOUS ASSESSMENT FOR LABORATORY COURSES:

Assessment	Continuous Assessment Weightage 60%		End-Semester Practical Examinations 40%	
	Duration	Weightage		
Semester in Exam - I	90 min	20	Pre-Examination Viva	10
Semester in Exam - I	90 min	20	Exercise	20
Lab Weekly Exercise	---	15	Record	05
Mini/ Capstone Project	---	05	External Review	05

- Every laboratory exercise / experiment should be evaluated based on the candidate's performance during the laboratory class /examination and the student's records maintained.

20.4 ASSESSMENT FOR LANGUAGE COURSES

Internal Assessment Marks

Test II	50 Marks (Reading & Writing)	Converts- 10 Marks
Speaking	2 Experiments	15 Marks
Listening	2 Experiments	15 Marks
Total		40 Marks

External Assessment Marks

End Semester Practical	Speaking (1 Experiment)	10 Marks
	Listening (1 Experiment)	10 Marks
End Semester Examination	100 marks (Reading & Writing)	Converts- 40 Marks
Total		60 Marks

20.5 ASSESSMENT FOR THEORY CUM LABORATORY COURSES

Component	Assessment	Continuous Assessment Weightage 50 %	End Semester Examination Weightage 50 %		
		Weightage	Assessment		Weightage
LAB	Exam Cycle – I	10	Lab Examination (120 Min)	Viva	5
				Experiment	10
THEORY	Semester in Exam I	12.5	End Semester Exam (Theory)	180 min	35
	Semester in Exam II	12.5			
	Surprise Quiz (min 2 – online open book test)	5			
	Assessment by course instructor	5			

20.6 ASSESSMENT FOR MINIPROJECT/PROJECT WORK

- Project work may be assigned to a single candidate or a group of candidates not exceeding 3 per group.
- There shall be a minimum of two assessments during the semester by a review committee. The student shall make a presentation to the committee on the progress made.
- The Head of the Department shall constitute a project review committee for each program.
- The project evaluation shall be carried out by a project committee comprising Head of the Department or his/her Nominee (Chairperson), Project Coordinator, (Professor/Associate Professor), and the Project Faculty Guide.
- The project work assessment shall be based on:
 - Conceptual understanding of Engineering Fundamentals
 - Ability to design and develop solutions and conduct investigations of complex problems
 - Ability to use modern engineering and IT tools
 - Decision-making ability
 - Interdisciplinary approach
 - Initiative, leadership, and sense of responsibility
 - Ability to produce research information for the team
 - Ability to demonstrate understanding of team rules when assigned, and share in teamwork
 - Ability to demonstrate good communication skills
 - Completion of objectives
 - Presentation
 - Answer to queries
- The candidate(s) is expected to submit the project report on or before the last working day of the semester/ on the date specified by the department.
- The semester-end examination for project work shall consist of an evaluation of the final project report submitted by the candidate or students of the project group by an external examiner followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner, the guide of the project group, and an internal examiner.

Continuous Assessment weightage 60%		End-semester examination weightage 40%	
Components	Weightage	Components	Weightage
Review I	15	Presentation	15
Review II	15	External Review	15
Review III		Report	10
		PLUS	
Report Review by Guide	15	Paper Publication	10

Ethics & Academic Integrity Requirements of Mini Project /Project work

Criteria for accepting similarity index (using Turnitin/Drillbit plagiarism check software), for the submission of UG Mini project / project work report:

- The overall similarity index should not exceed 25% , to be acceptable
- The highest similarity percentage from any one source should not exceed 4-6%.
- In case of self-plagiarism, the permissible percentage should not exceed, say at 7-10%.

20.7 ASSESSMENT OF CONTINUOUS ASSESSMENT COURSES

Continuous Assessment Weightage 100%		
Type of Course	Components	Weightage
ONE CREDIT	Quiz/ Assignment	25
	Test I	75
INDUSTRIAL TRAINING INTERNSHIP	Assessment by Industry	30
	Viva-voce	20
	Case Study / Report	20
	Presentation	30

21. PASSING REQUIREMENTS

21.1 A candidate who has obtained a **minimum of 45% marks in the end-semester examination, in both Theory and Practical Courses** (including Project work), is declared to have passed in the end-semester examination for that course.

21.2 A candidate who secures not less than 50% (Internal Assessment + End semester examinations marks) is declared to have passed in the examination for that course.

21.3 A student is deemed to have passed in any course carrying only Continuous Assessment marks if the total mark secured by him/her is **at least 50% of the total marks**. (Including Project work).

21.4 If a candidate fails to secure a pass in a theory course/laboratory course (except electives), the student shall register and appear only for the end-of-semester examinations in the subsequent semester. In such case, the internal assessment marks obtained by the candidate in the first appearance shall be retained till the **third attempt**. However, from the fourth attempt onwards, if candidate fails to obtain pass mark (Internal Assessment + End semester examinations mark),

then the candidate shall be declared to have passed the examination if s/he secures a minimum of 50% marks prescribed for the end semester examination alone.

21.5 A student who has already appeared for a course in a semester and passed the examination is not entitled to reappear in the same course for improvement of letter grades/marks.

22. AWARD OF LETTER GRADES

22.1 All assessments of a Course will be done on Uniform Evaluation Method of students based on Relative Grading if the course strength is greater than 30.

22.2 The same Ranges of Grades are applicable for the results of Revaluation/Reappearance/substitute /supplementary Examinations of that particular course.

22.3 Uniform Evaluation Method of students based on Relative Grading as issued by Registrar and Controller of Examinations office Anna University, Chennai through Letter No. 5883/AU/CAC/2022 dated 26.09.2022 is followed for the awarding of Grades.

22.4 This uniform evaluation method consists of the norms to be followed for the award of marks for internal and end semester examinations of all types of courses, passing requirements, relative grading and award of letter grades and classification of degree.

22.5 The award of letter grades will be decided based on relative grading principle. The relative grading is applicable to only those students who have passed the examination as per the passing requirement as in clause 21.

22.6 This is followed for the evaluation and passing of results for all the UG/PG students who joined from the academic year 2021-2022 onwards in the Autonomous Colleges affiliated to Anna University.

22.7 The process of Grade generation, the steps of Moderation, Normalization, Separation of Passed and Failed marks and then Grade Generation using the Anna University Relative Grading system(AURG).

22.8 All candidates with failed marks will be awarded a U Grade.

22.9 There will be six letter Grades for the passed candidates, such as O, A+, A, B+, B, and C.

Letter Grade	Description	Grade Points
O	Outstanding	10
A+	Excellent	9
A	Very Good	8
B+	Good	7
B	Average	6
C	Satisfactory	5
U	Re-appearance	0
RA-SA	Shortage of Attendance	
RA-AB	Absent for the End semester Examination	
WD	Withdrawal in the End semester Examination	

If the course strength is less than or equal to 30 then the fixed grading shall be followed with the Grade range as specified below:

O	A+	A	B+	B	C	U
91-100	81-90	71-80	61-70	56-60	50-55	<50

23. GPA AND CGPA CALCULATION

All assessments of a course will be done on an absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain number of points, will be awarded as per the range of total marks (out of 100) obtained by the candidate in each course.

After the results are declared, grade sheets will be issued to each student, which will contain the following details:

- The list of courses enrolled during the semester and the grades scored.
- The Grade Point Average (GPA) for the semester, which is calculated as follows:

$$GPA = \frac{\sum_{i=1}^n (C_i \times GP_i)}{\sum_i C_i}$$

The Cumulative Grade Point Average (CGPA), which is calculated as follows:

$$CGPA = \frac{\sum_{j=1}^n (C_j \times GP_j)}{\sum_j C_j}$$

Where C_i / C_j – is the credits assigned to the course

GP_i, GP_j - is the grade point corresponding to the letter grade obtained for each course

n - is number of all courses successfully cleared during the particular semester in the case of GPA and during all the semesters in the case of CGPA.

24. ELIGIBILITY FOR THE AWARD OF DEGREE

24.1A student shall be declared eligible for the award of the Degree if the candidate has

24.2 Successfully earned the required total credits as specified in the curriculum for his/her program of study within the allotted time.

24.3 Successfully completed the prescribed number of Value Added Courses* and mandatory courses if required by regulations.

24.4 Successfully completed any additional course assigned by the Head of the Institution when the candidate is readmitted under their regulations.

24.5 No disciplinary action is pending against him/her.

*Value-added courses (if any) are offered to facilitate the students to keep pace with the latest technologies pertaining to their chosen field of study. The students have the option to choose the course according to their interest and these courses will improve the employability of the students and assist them in exploring new opportunities.

25. CLASSIFICATION OF THE DEGREE AWARDED

I. FIRST CLASS WITH DISTINCTION

✓ B.E/B.Tech. (Regular)

A candidate who satisfies the following conditions shall be declared to have passed the examination in **First Class with Distinction**:

- ✓ Who qualifies for the award of the Degree having passed the examination in all the courses prescribed for the PROGRAM of study with in the **stipulated number of Semester of study in first appearance plus one year (Two Semesters)** which includes authorized break of study of one year (if availed).
- ✓ The candidate should have secured a **CGPA of not less than 8.50** in all the courses prescribed for the PROGRAM of study.
- ✓ The candidate should NOT have been prevented from writing semester end examination due to lack of attendance in any of the courses.

II. FIRST CLASS

✓ B.E/B.Tech. (Regular)

A candidate who satisfies the following conditions shall be declared to have passed the examination in First class:

- ✓ A candidate who qualifies for the award of the Degree having passed the examination in all the courses prescribed for the PROGRAM of study within the **stipulated number of semesters plus one year (Two Semesters)** reckoned from the commencement of study in the first Semester including authorized break of study (if availed) (or) Prevention from writing semester end examination due to lack of attendance (if applicable).
- ✓ The candidate should have secured a **CGPA of not less than 6.50** in all the courses prescribed for the PROGRAM of Study.

III SECOND CLASS

- ✓ All other candidates not covered in clause 25(I) and 25(II) who qualify for the award of the Degree shall be declared to have passed the Examination in Second Class.
- ✓ A candidate who has earned additional 18 credits as per the clause 25(I& II) but does not satisfy the conditions mentioned in the above clause shall not be awarded B.E/B.Tech (Honors) in such cases the grade sheet will show the additional courses studied and those courses shall not be considered for CGPA computations.

Classification of B. E./B. Tech. (Honors):

A Candidate is eligible for the B.E./ B.Tech. (Honors) degree if the following conditions are satisfied:

- ✓ The candidate who has completed additional courses from a specified group of professional electives (specialization) within the same PROGRAM and earned a minimum of 18 credits.
- ✓ The candidates who has passed all the courses prescribed in the curriculum as well as the additional courses in the first attempt.
- ✓ The candidates who has secured a minimum Cumulative Grade point Average (CGPA) of 7.50, calculated based on all courses including the additional courses.
- ✓ A candidate who has passed all the prescribed and additional courses in the first attempt and has secured a CGPA of 8.50 or above is eligible for the award of B.E./ B.Tech. (Honors) Degree with First Class with Distinction.
- ✓ However, there may be candidates who have passed all the courses, including the additional ones, in the first attempt but have not obtained a CGPA of 8.50. They will be awarded of B.E./ B. Tech. (Honors) Degree with First Class (CGPA less than 8.50, including additional courses).
- ✓ Some Candidates might have attained a CGPA of 8.50 when considering only the regular curriculum and benefiting from the grades obtained in the courses, such students will be awarded B.E/B. Tech. (Regular) Degree with First Class with Distinction, considering the improved CGPA due to good grades earned in the additional courses.
- ✓ The candidate should NOT have been prevented from writing semester end examination due to lack of attendance in any of the courses.

Eligibility for B.E./B.Tech. (Minor):

A candidate is eligible for the B.E./ B.Tech. (Minor) degree if the following condition is satisfied:

- ✓ The Candidate has earned an additional minimum of 18 credits from the courses offered in any one of the following domains: Engineering, Science and Humanities, or Management.

Classification of B.E./ B.Tech.(Minor):

- ✓ A Candidate who has passed all the prescribed and additional courses in the first attempt and has secured a CGPA of 8.50 or above is eligible for the award B.E./B.Tech. (Minor)Degree with First Class with Distinction.
- ✓ However, there may be candidates who have passed all the courses, including the additional ones, in the first attempt but have not obtained a CGPA less than 8.50 including additional courses.
- ✓ Some Candidates might have attained a CGPA of 8.50 when considering only the regular curriculum and due to strong performance in the additional courses, such students will be awarded of B.E./ B.Tech. (Regular) Degree with First Class with Distinction, considering the enhanced CGPA due to the grades in the additional courses.

26. RANK

- ✓ A student shall be eligible for award of ranking only if he/she has passed the examination in **First class with distinction or First class in having passed all the courses in first attempt.**
- ✓ Those who have availed the provision of break of study / withdrawal will not be eligible for rank.
- ✓ Ranks will be awarded only for a maximum of 5% the Class strength.

27. PROCEDURE FOR COMPLETING THE COURSE

27.1 The academic year will be from June to May in which odd semester will be from the period of June to November/ December, and the even semester from December to May / June respectively.

27.2 A candidate who has a break of study for some reason in any one of the semesters in the degree of study can rejoin the course in that semester only at the time of its normal commencement in the Institution for regular students upon satisfying the following conditions.

27.3 He/She should have obtained the approval from the DOTE and Affiliating University.

27.4 He /She should have completed the courses of study of the previous semesters.

27.5 He/She should have registered/appeared for all the Examinations of the previous semesters.

27.6 A candidate will be permitted to proceed from one semester to the next Semester only if he / she has satisfied the regulation for eligibility to appear for the Semester End Examination in the semester concerned.

27.7 It is mandatory that a candidate has to complete the required number of value added courses during the duration of the program.

27.8 It is mandatory to successfully complete the required Employability Enhancement Course /other mandatory courses during the duration of the program.

No candidate will be enrolled in more than one Semester at any time. In the case of repeaters / Readmission, the earlier Internal Assessment in the respective courses will be disregarded.

28. END SEMESTER EXAMINATIONS

28.1 There shall be a Semester End Examinations of 3 hours duration in each lecture/tutorial based courses.

28.2 The Semester End Examinations shall be conducted between October and December / January during the Odd semesters and between March and May/June in the Even Semesters.

28.3 If a student indulges in malpractice during examinations, the student shall be liable for punitive action as prescribed by the University from time to time.

28.4 A candidate who is absent for semester examination in a Course/Project Work after having enrolled for

the same shall be considered to have attempted in that examination for the purpose of classification.

28.5 Supplementary Examinations may also be conducted at such times as may be decided by the Chairperson of the Academic Council/Principal subject to the approval of the Academic Council.

28.6 After the duration of the program (stipulated number of semesters), the passing requirement in the Semester End Examinations will be 50% marks in the Semester End Examination for that course.

29 TRANSPARENCY IN EVALUATION

29.1 After the publication of End Semester results, the students are allowed to verify the answer scripts of all courses as per approved norms.

29.2 Subsequently, the application for revaluation of the answer scripts for those courses is permitted.

29.3 The verification of answer scripts or Photocopy is not permitted for practical courses, one credit courses, seminars, practical training project work and other continuously assessed courses.

30 REVALUATION & REVIEW

The students are entitled for the following within fifteen days from the declaration of the results.

30.1 As per the regulations, there is only one valuation. However, a candidate after verification of their answer scripts, if not satisfied with the Grades allotted, then they can apply for Revaluation on payment of the prescribed fee. If the student is not satisfied with the Grades allotted after Revaluation, they can apply for a **Review of answer script**.

30.2 Only a candidate who has applied for the verification of answer script or Photocopy and Revaluation of the answer script is eligible for applying for review of answer script.

30.3 The Revaluation of theory cum laboratory courses is not permitted.

30.4 The prescribed fee for the review of answer script should be paid. The refund of the fee will be made for the candidate who has failed originally and secured a pass mark after the review of answer script.

31 ISSUE OF STATEMENT OF GRADES AND DEGREE CERTIFICATE

After the publication of the results in each semester, the Institution will issue the Statement of Grades. After the successful completion of the Degree program, the Academic Council of the Institution will recommend the list of candidates to the University for the award of the Degree Certificates.

32 PROVISION FOR WITHDRAWAL FROM EXAMINATION:

32.1 A candidate may for valid reasons and on prior application, (medically unfit/Unexpected family situations/sports approved by the Head of the Institution) may be granted permission to withdraw from appearing for the Semester End Examinations in any course or courses in **only one semester examinations during the entire duration of the Degree Program**.

32.2 Withdrawal application shall be valid only if the candidate is eligible to appear for the Examination in that course and if it is made **prior to the commencement of the examination in that course(s)** duly recommended by the Head of Department and approved by the Head of the Institution.

32.3 Withdrawal shall not be construed as an appearance for the eligibility of a candidate for First Class with Distinction.

32.4 The candidate shall reappear for the withdrawn Course / Courses during the Examination conducted in the immediate subsequent Semester. Withdrawal is not permitted in the Semester End Examinations in the final semester of the period of study by the candidate.

33 BREAK OF STUDY FROM A PROGRAM

- 33.1 The candidates permitted to rejoin the program after break of study shall be governed by the Curriculum and Regulations in force at the time of rejoining.
- 33.2 The students rejoined in any of the Semesters have to gain the stipulated number of credits to become eligible for the award of degree, under the regulations in vogue at the time of his/ her rejoining.
- 33.3 The total period for completion of the program reckoned from the commencement of the course for the first Semester to which the candidate was admitted shall not exceed the maximum period, irrespective of the period of break of study in order that he/she may be eligible for the award of the Degree.
- 33.4 If any student is detained for want of required attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'Break of Study'.

34 FACULTY ADVISOR AND CLASS COMMITTEE

To help the students in planning their courses of study and for general advice on the Academic PROGRAM, the Head of the Department will attach a certain number of students to a teacher of the Department who shall function as Faculty Advisor for those students throughout their period of study. Such Faculty Advisor shall advise the students and monitor the courses taken by the students, check the attendance and progress of the students attached to him / her and counsel them periodically. If necessary, the Faculty Advisor may also discuss with or inform the parents about the progress of their wards. An Academic Coordinator will monitor the Faculty Advisors.

The class committee consists of teachers who handle the class, student representatives and a chairperson who is not handling the course for that class. It is like the 'Quality Circle' with the overall goal of improving the teaching-learning process.

The functions of the Class Committee include:

- Solving problems faced by students in the classroom and in the laboratories.
- Clarifying the regulations of the Degree PROGRAM and the details of rules there in.
- Informing the student representatives about the academic schedule dates and the syllabus coverage.
- Informing the student representatives about the regulations regarding weightage used for each assessment.
- In case of Practical Courses (Laboratory /Drawing / Project Work / Seminar etc.) the breakup of marks for each Experiment/exercise/module of works, should be clearly interacted with the representatives In the Class Committee Meeting who would inform the students.
- Analyzing the performance of the students of the class after each Test and finding the ways and means of solving problems, if any.
- Identifying the weak students, if any and requesting the teachers concerned to provide some additional help or guidance or coaching for such weak students.

The Class Committee for a class under a particular program is constituted by the Head of the Department.

The Class Committee shall be constituted in the first week of the Semester. Two or three subsequent meetings may be held at suitable intervals. During these Meetings, the student members representing the entire class, shall meaningfully interact and express their opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process. At least 10 student representatives (including girls) shall be included in the Class Committee.

The Chairperson of the Class Committee may invite the Academic Coordinator, Faculty advisor(s) and the Head of the Department to the meeting of the Class Committee.

The Chairperson has to prepare the minutes of every meeting, submit the same through the Head of the Department to the Head of the Institution with in two days of the Class Committee meeting and arrange to circulate among the students and teachers concerned. If there are some points in the minutes, requiring action by the authorities concerned, the same shall be brought to the notice of the authority by the Head of the Institution.

35 MANDATORY COURSES (MAC)

- These courses include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc.
- The Tamil Courses and their syllabi as recommended by Anna University, Chennai, as per the circular letter No.618/CAC/TC/2023 dated 01.03.2023, are included as the Liberal Arts courses.
- Successful completion of the Tamil courses is essential for being eligible for the award of a degree.

Course Code	Course Title	Credits
20HS211	Tamizhar Marabu (Heritage of Tamils)	1
20HS212	Thamizharum Thozhilnutpamum (Tamils and Technology)	1

36 Universal Human Values and Professional Ethics Course

- A course on Universal Human Values and Professional Ethics is mandatory to all the candidates of the various B.E /B.Tech program as per the recommendations of AICTE.
- The content will be delivered in three, fifteen-hour courses.
- The first two contents of fifteen hour course will be common to all Programs of B.E/B.Tech and in continuation to the Universal Human Values delivered during the first year Induction PROGRAM.
- The third fifteen hour content is to be PROGRAM specific and to be delivered by the specific department.
- It is essential to complete the Universal Human values and Professional Ethics course by all the candidates of B.E/B.Tech program.

37 DISCIPLINE

Every student has to maintain discipline both inside and outside the Institution and not to indulge in any activity that may spoil the name of the Institution. The Head of the Institution shall constitute a Disciplinary Committee which will enquire into act so find discipline and report to the Head of the Institution.

38 REVISION OF REGULATIONS, CURRICULUM AND SYLLABI

The Institution may, from time to time revise, amend or change the regulations, scheme of examinations and syllabi if demand necessary, subject to the approval of the Academic Council and the affiliating University.

CURRICULUM AND SYLLABUS FOR

ABILITY ENHANCEMENT COURSES (AEC)

BASIC SCIENCES (BSC)

ENGINEERING SCIENCES (ESC)

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT (HSMC)

LIBERAL ARTS (LA)

MANDATORY COURSES (MC)

EMERGING TECHNOLOGY COURSES (ETC)



CURRICULUM

Sl. No.	Course Code	Course	L	T	P	C	POs	CA	ES	TOTAL
Ability Enhancement Course (AEC)										
1	25HS204	Design Thinking	1	0	0	1	2,3,4	100	-	100
Basic Science Courses (BSC)										
2	25MA201	Matrices and Calculus	3	1	0	4	1,2,5,8 9,11	40	60	100
3	25MA202	Linear Algebra & Number Theory	3	1	0	4	1,2,8,9 11	40	60	100
4	25MA203	Transforms & Complex Variables	3	1	0	4	1,2,8,9 11	40	60	100
5	25MA204	Transforms & Partial Differential Equations	3	1	0	4	1,2,8,9 11	40	60	100
6	25PH251	Applied Physics	2	0	2	3	1,2,5,8 9	50	50	100
7	25PH252	Material Physics	2	0	2	3	1,2,5,8 9	50	50	100
8	25PH253	Engineering Physics	2	0	2	3	1,2,5,8 9	50	50	100
9	25CH201	Green Computing	2	0	0	2	1,6,11	40	60	100
10	25CH202	Electronic Material Sciences	2	0	0	2	1,2,11	40	60	100
11	25CH203	Environment & Sustainability	2	0	0	2	1,6,11	40	60	100
12	25CH204	Electrochemical Energy Systems	2	0	0	2	1,11	40	60	100
13	25IT201	Bio-Inspired Computing	1	0	0	1	1,2,3	40	60	100
Engineering Science Course (ESC)										
14	25CS251	C Programming	2	0	4	4	1,2,3,5 9	50	50	100
15	25CS270	Computer Practices Workshop	0	0	2	1	1,2,3,4 5,9	60	40	100

16	25IT251	Object Oriented Programming	2	0	4	4	1,2,3,4 5,9	50	50	100
17	25EC202	Digital Principles and System Design	3	0	0	3	1,2,5,8	40	60	100
18	25CS252	Data Structures	2	0	2	3	1,2,3,5 9	50	50	100
19	25EE201	Electric Circuit Analysis	3	1	0	4	1,2,5	40	60	100
20	25EE202	Applied Electrical & Electronics Systems	3	0	0	3	1,2,5,6	40	60	100
21	25EC201	Semiconductor Devices	3	0	0	3	1,2,5, 11	40	60	100
22	25ME201	Engineering Mechanics	2	1	0	3	1,2	40	60	100
23	25EE270	Electrical Workshop	0	0	2	1	1,2,6,8 ,9	60	40	100
24	25EE271	Electric Circuits & Electron Devices Laboratory	0	0	2	1	1,2,5,8 9	60	40	100
25	25EC270	Electronics Engineering Workshop	0	0	2	1	1,2,5,6 8,9,11	60	40	100
26	25ME270	Engineering Graphics	0	0	4	2	1,2,5	60	40	100
27	25ME271	Digital Hardware Technologies	0	0	4	2	1,4,5,6	60	40	100
Humanities and Social Sciences including Management (HSSM)										
28	25HS251	Technical English	2	0	2	3	5,9,11	40	60	100
29	25HS270/ 25HSXXX	Professional English/ Foreign Language	0	0	2	1	5,9,11	50	50	100
Liberal Arts (LA)										
30	25HS203	Yoga	1	0	0	1	6	100	-	100
31	25HS201	Heritage of Tamils	1	0	0	1	11	100	-	100
32	25HS202	Tamils and Technology	1	0	0	1	11	100	-	100
33	25MA205	Vedic Mathematics for Engineers	1	0	0	1	1,2,5, 11	100	-	100
34	25MA206	Foundations of Problem Solving	1	0	0	1	1,2,4,9 11	100	-	100
35	25ME202	Industrial Revolutions & Emerging Trends in Manufacturing	2	0	0	2	1,2,5,6 10,11	40	60	100
Mandatory Course (MC)										
36	25HS252	Universal Human Values: Understanding Harmony I	1	0	0	0	7,11	100	-	100
37	25HS253	Universal Human Values: Understanding Harmony II	1	0	0	0	7,11	100	-	100
Emerging Technology Courses (ETC)										
38	25IT202	Modern Digital Technologies	2	0	0	2	1,2,3,4 5,6	40	60	100



ABILITY ENHANCEMENT COURSES (AEC)





25HS204	DESIGN THINKING	L	T	P	C
		1	0	0	1

COURSE OUTCOMES:

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Apply empathy research methods to identify and understand user needs in engineering contexts.	2,4	-
CO2	Synthesize user data and formulate clear problem statements using structured analysis techniques.	2,4	-
CO3	Generate innovative solutions through systematic ideation methods and concept evaluation frameworks.	2,3	-
CO4	Create and validate prototypes using rapid testing methods to iterate engineering solutions.	3,4	-

Empathize Phase

[3]

Human-centred design principles, user interviews, empathy mapping, persona development, stakeholder identification, journey mapping. Case Study.

Analyse Phase

[4]

Data synthesis, insight generation, pattern recognition, problem statement formulation, root cause analysis, affinity mapping, How Might We questions, problem definition canvas, 5 Whys technique. Case Study.

Solve Phase

[4]

Creative ideation, divergent vs convergent thinking, brainstorming, SCAMPER technique, idea sketching, concept selection matrix, solution feasibility assessment. Case Study.

Test Phase

[4]

Rapid prototyping, prototype fidelity levels, testing methodologies, iteration principles, paper prototyping, digital wire framing, user testing scripts, feedback collection methods. Case Study.

Total Notional Hours: 30

TEXT BOOKS:

1. Brown, Tim. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. Harper Business, 2019

REFERENCES:

1. Norman, Donald A. The Design of Everyday Things: Revised and Expanded Edition. Basic Books, 2013.
2. Kumar, Vijay. 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization. Wiley, 2012.

ONLINE RESOURCES:

IDEO Design Kit: www.designkit.org



BASIC SCIENCE COURSES (BSC)





25MA201	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Explain the fundamental concepts expressed as matrix algebra, multivariable calculus and the solution techniques for ordinary differential equations.	1,2	-
CO2	Recall the definitions of eigenvalues and eigenvectors, notations of partial and total derivatives of vector field and standard form of second and higher order ODE.	1,2	-
CO3	Apply mathematical techniques from matrix theory, calculus and differential equations to solve interdisciplinary problems.	1,11	-
CO4	Examine multivariable functions, vector fields, differential equations and real-world dynamic systems, like elastic membranes and vibrating systems.	1,2,8,9,11	-
CO5	Integrate mathematical tools from matrices, multivariable calculus, vector calculus and differential equations to solve real-world physical systems.	1,2,5,8,9,11	-

MATRICES

[9+3]

Introduction – Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem (without proof)– Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Stretching of an Elastic Membrane – Vibrating System of two masses on two springs.

MULTIVARIABLE CALCULUS

[9+3]

Partial derivatives – Total derivative – Differentiation of implicit functions – Change of variables – Jacobian – Partial differentiation of implicit functions – Taylor's series for functions of two variables maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

MULTIPLE INTEGRALS

[9+3]

Double integrals – Change the order of integration - Double integrals in polar coordinates – Triple integrals – Rectangular Coordinate System – Cylindrical and Spherical Polar coordinates.

VECTOR CALCULUS

[9+3]

Gradient and directional derivative – Divergence and curl - Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's theorem, Gauss divergence theorem and Stoke's theorems (without proofs)– Verification and application in evaluating line, surface and volume integrals.

ORDINARY DIFFERENTIAL EQUATIONS

[9+3]

Solution of second and higher order linear differential equations with constant coefficients - Method of variation of parameters - Cauchy's and Legendre's linear differential equations - Simultaneous first order linear differential equations with constant coefficients.

Total Notional Hours: 120

CASE STUDIES

List of MATLAB Programs

- Introduction to MATLAB.
- Matrix Operations - Addition, Subtraction, Multiplication, Transpose and Inverse.
- Finding Eigenvalues and Eigenvectors of Higher Order Matrices.
- Finding Maxima and Minima of functions of two variables.
- Applications of Taylor's series expansion to find continuity equation in bipolar transistors.
- Solution of second and higher order ordinary differential equations with constant coefficients
- Analysis of Dynamic characteristics of Biosensors using ordinary differential equations
- Evaluating double and triple integral with constant and variable limits.
- Finding area as double integral.
- Finding volume as triple integral.

TEXT BOOKS:

1. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2022.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 11th Edition, Wiley India, 2025.
3. T. Veerarajan, "Engineering Mathematics I & II", 3rd Edition, McGraw Hill Education India, 2018 (Reprint).

REFERENCE BOOKS:

1. James Stewart, "Calculus, Early Transcendental", 9th Edition, Cengage learning, New Delhi, 2020.
2. Joel Hass, Christopher Heil and Maurice D.Weir, Thomas "Calculus", Pearson, 14th Edition, New Delhi, 2018.
3. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, New Delhi, 2017.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_ma79/preview \t "_blank.
2. <https://www.khanacademy.org/math/linear-algebra/alternate-bases/eigen-everything/v/linear-algebra-introduction-to-eigenvalues-and-eigenvectors>.
3. <https://www.mathworks.com>.

25MA202	LINEAR ALGEBRA AND NUMBER THEORY	L	T	P	C
		3	1	0	4

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Explain the concepts of linear algebra and number theory, including the structure of vector spaces, orthogonality, and congruences.	1,2	-
CO2	Recall the definitions, notations, and fundamental theorems related to vector spaces, linear transformations, inner product spaces, and number theory.	1,2	-
CO3	Use linear algebra techniques and number theory tools to solve computational and theoretical problems.	1,11	-
CO4	Analyze the properties of linear mappings, orthogonality conditions, and congruences in number theory.	1,2,8,9,11	-
CO5	Construct solutions using concepts from linear algebra and number theory to solve complex and non-standard problems.	1,2,8,9,11	-

LINEAR SPACE

[9+3]

Vector spaces, Subspaces, Linear Combinations, Linear Spans, row space and column space of a Matrix, Linear Dependence and Independence, Basis and Dimension, Coordinates.

LINEAR TRANSFORMATIONS

[9+3]

Introduction, Linear Mappings, Geometric linear transformation of $\mathbb{R}^2$, Kernel and Image of a linear transformations, Matrix representation of linear transformations, Rank-Nullity Theorem (without proof), Singular and Nonsingular linear transformations, Invertible linear transformations.

INNER PRODUCT SPACES

[9+3]

Inner product, inner product spaces, length and orthogonality, orthogonal sets and Bases, projections, Gram-Schmidt process, QR-factorization, least squares problem and least square error.

CONGRUENCES

[9+3]

Introduction, Congruences and Equivalence Relations, Linear Congruences, Linear Diophantine Equations and the Chinese Remainder Theorem, Modular Arithmetic: Fermat's Theorem, Wilson's Theorem and Fermat Numbers. Polynomial Congruences, Pythagorean equations, Legendre symbol, Quadratic reciprocity, the Jacobi symbol.

NONLINEAR DIOPHANTINE EQUATIONS

[9+3]

Pythagorean triangles, Fermat's last theorem, Sum of Squares, Pell's equation, Mordell's equation.

Total Notional Hours: 120

CASE STUDIES

List of Experiments (MATLAB)

- Finding bases and dimensions for the vector spaces and subspaces.
- Finding the matrix representation of a linear transformation.
- Data Transmission and processing of digital signals using vector spaces.
- Prime number checker
- Euclidean Algorithm
- Extended Euclidean Algorithm
- Modular inverse
- Fermat's Little theorem

TEXT BOOKS:

1. Richard Bronson, Gabriel B.Costa, "Linear Algebra", 6th Edition, Academic Press Publications 2023.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 11th Edition, Wiley India, 2025.
3. Thomas Koshy, "Elementary number theory with Applications", Academic Press Inc, 2nd Edition-2009.

REFERENCE BOOKS:

1. Davis C Lay, Stephen R, Linear Algebra and its Applications, 6th Edition, Pearson, 2020
2. Neville Robbins, Beginning Number Theory, 2nd Edition-Jones and Barlett Publications, 2006.
3. David M Burton, Elementary Number Theory, Tata McGraw Hill Publ.-1st Edition 2010.
4. Gareth A. Jones and Josephine Mary Jones, Elementary Number Theory, Springer 1998.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_ma114/preview
2. https://onlinecourses.nptel.ac.in/noc25_ma102/preview
3. <https://www.mathworks.com>

25MA203	TRANSFORMS AND COMPLEX VARIABLES	L	T	P	C
		3	1	0	4

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Explain the underlying principles and theorems of transforms and complex functions.	1,2	-
CO2	Recall the fundamental concepts and properties of Laplace, Fourier, Z-transforms and techniques of analytic functions and complex integration.	1,2	-
CO3	Use Laplace, Fourier and Z-transforms to solve ordinary differential equations and difference equations in engineering contexts.	1,11	-
CO4	Examine continuous and discrete domain methods, analytic functions and complex integrals in engineering field.	1,2,8,9,11	-
CO5	Construct solutions by combining transform methods and complex variable techniques to solve engineering problems.	1,2,8,9,11	-

LAPLACE TRANSFORMS

[9+3]

Transform of elementary functions -Properties - Transform of derivatives and integrals - Transform of unit step function, Unit impulse function - Transform of Periodic functions - Inverse Laplace transforms – Convolution theorem - Initial and Final value theorems - Solution of linear second order ordinary differential equations with constant coefficients.

FOURIER TRANSFORMS

[9+3]

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Finite Fourier sine and cosine transforms.

Z TRANSFORMS

[9+3]

Z- Transforms - Elementary properties – Inverse Z - transform (using partial fraction and residues) – Convolution theorem - Formation of difference equations – Solution of difference equations using Z - Transform.

ANALYTIC FUNCTIONS

[9+3]

Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: $w = z+k$, $w = kz$, $w = 1/z$ and bilinear transformation.

COMPLEX INTEGRATION

[9+3]

Complex integration – Statement of Cauchy's integral theorem - Cauchy's integral formula – Taylor's and Laurent's series expansions – Singular points – Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

Total Notional Hours: 120

CASE STUDIES

List of MATLAB Program

- Solution of Differential equations using Laplace Transform techniques
- Solution of Difference equations using Z-transform techniques
- Rate of change of output signals with respect to input signals using Laplace transform
- Image analysis using Fourier transforms
- Analysis of discrete signals using Z-transforms
- Evaluating a complex integral.
- Comparison of Taylor's series approximation with actual function.
- CT Image based Reconstruction Techniques using analytic functions.
- Analysis of Biosignals using Cauchy's contour integral technique.
- Find solution for Maxwell's Equation.

TEXT BOOKS:

1. Grewal. B.S, “Higher Engineering Mathematics”, 44th Edition, Khanna Publications, Delhi, 2022.
2. Erwin Kreyszig, “Advanced Engineering Mathematics”, 11th Edition, Wiley India, 2025.
3. T. Veerarajan, “Engineering Mathematics I & II”, 3rd Edition, McGraw Hill Education India, 2018 (Reprint).

REFERENCE BOOKS:

1. Ravish R Singh and Mukul Bhatt, “Engineering Mathematics”, 1st Edition, Tata McGraw Hill Education, New Delhi, 2020.
2. Srimanta Paul and Subodh C. Bhunia, “Engineering Mathematics”, Oxford University Press, 1st Edition, 2015.
3. Peter V.O’Neil, “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, 8th Edition, New Delhi, 2017.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_ma85/preview
2. <https://www.khanacademy.org/math/differential-equations/laplace-transform>
3. <https://www.mathworks.com>

25MA204	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Explain principles of transform techniques, partial differential equations and the behavior of functions in time/frequency domains.	1,2	-
CO2	Recall fundamental definitions, standard formulas, properties, and theorems related to Laplace transforms, Fourier series and transforms, Z-transforms, and partial differential equations.	1,2	-
CO3	Solve ordinary differential equations, difference equations, and partial differential equations using Laplace, Fourier, and Z-transform techniques.	1,11	-
CO4	Analyze various types of transforms and partial differential equations to determine suitable solution.	1,2,8,9,11	-
CO5	Construct solutions to engineering and mathematical problems with appropriate differential or difference equations using transform methods.	1,2,8,9,11	-

LAPLACE TRANSFORMS

[9+3]

Transform of elementary functions -Properties - Transform of derivatives and integrals - Transform of unit step function, Unit impulse function - Transform of Periodic functions - Inverse Laplace transforms – Convolution theorem - Initial and Final value theorems - Solution of linear second order ordinary differential equations with constant coefficients.

PARTIAL DIFFERENTIAL EQUATIONS

[9+3]

Formation of PDE by elimination of arbitrary constants and functions – Solutions of first order equations – Standard types and Equations reducible to standard types (Type I to 4 only) – Singular solutions – Lagrange's linear equation – Solution of second and higher order homogeneous and non-homogeneous linear equations with constant coefficients.

FOURIER SERIES

[9+3]

Dirichlet's conditions – Expansion of periodic functions into Fourier series – Change of interval – Fourier series for even and odd functions – Half-range expansions – Root mean square value of a function – Parseval's identity – Harmonic analysis.

FOURIER TRANSFORM

[9+3]

Statement of Fourier integral theorem (without proof) – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

Z - TRANSFORM

[9+3]

Z-transforms – Elementary properties – Inverse Z-transform (using partial fraction and residues)- Initial and final value theorem– Convolution theorem – Formation of difference equations – Solution of difference equations using Z - transform.

Total Notional Hours:120

CASE STUDIES

List of MATLAB Programs

- Solution of Differential equations using Laplace Transform techniques
- Rate of change of output signals with respect to input signals using Laplace transform
- Time response of RLC circuit using Laplace transformation in MATLAB
- Analysis of RLC circuit for different conditions using Laplace Transforms.
- Solution of Difference equations using Z-transform techniques
- Image analysis using Fourier transforms
- Analysis of discrete signals using Z-transforms

TEXT BOOKS:

1. Grewal. B.S, “Higher Engineering Mathematics”, 44th Edition, Khanna Publications, Delhi, 2022.
2. Erwin Kreyszig, “Advanced Engineering Mathematics”, 11th Edition, Wiley India, 2025.
3. T. Veerarajan, “Engineering Mathematics I & II”, 3rd Edition, McGraw Hill Education India, 2018 (Reprint).

REFERENCE BOOKS:

1. Ravish R Singh and Mukul Bhatt, “Engineering Mathematics”, 1st Edition, Tata McGraw Hill Education, New Delhi, 2020.
2. Srimanta Paul and Subodh C. Bhunia, “Engineering Mathematics”, Oxford University Press, 1st Edition, 2015.
3. Peter V.O’Neil, “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, 8th Edition, New Delhi, 2017.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_ma85/preview
2. https://www.khanacademy.org/math/differential-equations/laplace-transform_
3. <https://www.mathworks.com>.

25PH251	APPLIED PHYSICS	L	T	P	C
		2	0	2	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Understand the fundamental principles underlying intrinsic and extrinsic semiconductors.	1	-
CO2	Differentiate between the various types of magnetic materials and superconductors.	1	-
CO3	Understand the quantum mechanical principles, various sensors and insulators.	1	-
CO4	Apply appropriate techniques to synthesize and characterize nanomaterials for analyzing their structural and functional properties	1	-
CO5	Simulate experiments related to quantum mechanics and semiconductor physics	1,2,5,8,9	-

SEMICONDUCTOR MATERIALS

[6]

Intrinsic Semiconductor – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductor – Extrinsic semiconductor - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature Applications: LED, solar cell, Photo diodes, PIN diodes, Avalanche diodes.

MAGNETIC AND SUPERCONDUCTING MATERIALS

[6]

Magnetic materials: dia, para, ferro & ferrites - domain theory of ferromagnetism -hysteresis - Applications: Spintronics and Biomedical.

Principle & Properties of superconductor, Types: Type I, Type II, **High-Temperature**, Organic and Heavy Fermion Superconductors – Applications: SQUID & superconducting qubits in quantum computer.

QUANTUM PHYSICS

[6]

Classical vs quantum information - Wave particle duality, de Broglie waves- Heisenberg's uncertainty principle. Wave function- normalization. Schrodinger's equation of motion: Time dependent and independent form. Particle in a one-dimensional box and quantum tunneling.

NANO MATERIALS

[6]

Classification based on dimensionality - Quantum Dots, Wires and Wells -graphene- Synthesis of nano materials: Top-Down Process- Mechanical Milling, Bottom -up approach – CVD & PLD – engineering application - Sensors & Energy Storage.

SENSORS AND DIELECTRICS

[6]

Characteristics of sensors: sensitivity, range, resolution, linearity, hysteresis, response time, and accuracy. Temperature sensor: Hot wire anemometer, Thermocouples. Pressure Sensors: Capacitance based and Piezoelectric, Liquid level Sensors: Hall Effect and Ultrasonic. Dielectrics: Electrical, thermal and acoustic Insulators.

LIST OF EXPERIMENTS

[15]

1. Simulation and Analysis of PN Junction Diode V-I Characteristics.
2. Determination of band gap using semiconductor diode.
3. Thermistor: Measurement of temperature and band gap.
4. Experimental Analysis of Photodiode Characteristics
5. Determination of resistivity of metal and alloy using Carey Foster Bridge.
6. Determine the Planck's constant using Photo Electric method.
7. Generation and Initialization of a Qubit for Quantum Computation.
8. Simulation of the Quantum Double-Slit Experiment: Demonstrating Particle-Wave Duality.
9. Spintronic Device Simulation: Spin Valve / Magnetic Tunnel Junction.
10. Study of Graphene's properties.

Total Notional Hours: 90

TEST BOOKS:

1. Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar, "Engineering Physics" S. Chand Publishing, 1st Edition, 2023.
2. David A. B. Miller, "Quantum Mechanics for Scientists and Engineers" Cambridge University Press, 2008.

REFERENCE BOOKS:

1. J.J. Sakurai, "Modern Quantum Mechanics" Cambridge University Press, Third Edition, 2020.
2. Ashutosh Sharma and Goldie Oza "Nano chemistry: Synthesis, Characterization, and Applications", CRC Press 1st Edition, 2023.

WEB REFERENCES

1. <https://nptel.ac.in/courses/108108122>
2. <https://nptel.ac.in/courses/115105131>
3. <https://nptel.ac.in/courses/115101010>
4. <https://nptel.ac.in/courses/118104008>
5. <https://nptel.ac.in/courses/108108147>

25PH252	MATERIAL PHYSICS	L	T	P	C
		2	0	2	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Understand the fundamental quantum physics concepts, including the de Broglie hypothesis, the Heisenberg uncertainty principle, and the Schrödinger equation formulations.	1	-
CO2	Classify the schemes of nanomaterials based on dimensionality and identify key characterization techniques.	1	-
CO3	Analyze the particle in a box quantum mechanical model using the physical significance of wave functions	2	-
CO4	Understand synthesis methods and unique properties of graphene and quantum dots.	1	-
CO5	Perform experimental characterization of material properties, including band gap determination, resistivity measurement, and photoelectric effect analysis.	1	-
CO6	Simulate quantum phenomena and the behavior of nanomaterials using computational tools.	1,2,5,8,9	-

FUNDAMENTALS OF QUANTUM PHYSICS IN MATERIALS

[10]

Photons and light waves; electrons and matter waves- de Broglie hypothesis and experimental verification- Heisenberg uncertainty principle - Wave function- normalization - Schrödinger equation- Time-dependent and independent form. Physical Significant of wave function- Particle in a one-dimensional box. Applications: quantum computing.

NANO MATERIALS

[10]

Classification based on dimensionality - Quantum Dots, Wells and Wires- Carbon based nano materials - Graphene- Structure and properties- Applications of Graphene - Synthesis of nano materials: Top-Down Process- Mechanical Milling (Quantitative), Bottom -up approach – electro chemical deposition - chemical (CVD), physical (PVD) and applications of nanomaterials in engineering and medical field - bio materials and applications.

CHARACTERIZATION TECHNIQUES AND ADVANCED ENGINEERING MATERIAL

[10]

Introduction to Structural Characterization of Materials and properties. X-ray diffraction (XRD), electron microscopy Techniques fundamentals: SEM and TEM principles -Metallic glasses – preparation, properties and applications – Shape Memory Alloy (SMA) – mechanisms and phase transformations - Characteristics and properties of NiTi alloy and applications.

LIST OF EXPERIMENTS

[15]

1. Simulation and Analysis of PN Junction Diode V-I Characteristics.
2. Determination of band gap using semiconductor diode.

3. Thermistor : Measurement of temperature and band gap.
4. Experimental Analysis of Photodiode Characteristics
5. Determination of resistivity of metal and alloy using Carey Foster bridge.
6. Determine the Planck's constant using Photo Electric method.
7. Generation and Initialization of a Qubit for Quantum Computation.
8. Simulation of the Quantum Double-Slit Experiment: Demonstrating Particle-Wave Duality.
9. Spintronic Device Simulation: Spin Valve / Magnetic Tunnel Junction.
10. Study of Graphene's properties.

Total Notional Hours: 90

TEXT BOOKS:

1. Dr.M.N.Avadhanalu , Dr.P.G. Kshirsagar P G, "Engineering Physics", S. Chand & Company Ltd, Edition , 2023.
2. Halliday, Resnick and Walker, "Fundamentals of Physics", Wiley International Publications, Extended 10th Edition, 2015.

REFERENCE BOOKS:

1. Charles Kittel, "Introduction to Solid State Physics", Wiley India Pvt. Ltd, 7 ed., 2012
2. Gaur R K and Gupta S L, "Engineering Physics", Dhanpat Rai Publications, 2018.
3. Marikani A, "Engineering Physics, PHI Publications", 2nd Edition, 2014.
4. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw Hill (Indian Edition), 2024.
5. Binns, Chris, "Introduction to nanoscience and nanotechnology", John Wiley & Sons, 2021.

WEB REFERENCES:

1. <https://nptel.ac.in/courses/118104008>
2. <https://nptel.ac.in/courses/104104082>
3. <https://nptel.ac.in/courses/115101010>

25PH253	ENGINEERING PHYSICS	L	T	P	C
		2	0	2	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Classify various magnetic materials based on their fundamental properties and physical behavior.	1,2	-
CO2	Understand the core principles of quantum mechanics and the essential concepts of superconductivity.	1,2	-
CO3	Perform experiments to investigate semiconductor properties and relate the findings to theoretical models.	1,2	-
CO4	Simulate quantum phenomena and spintronic devices using computational tools to validate quantum principles.	1,2,5	-
CO5	Connect the theoretical foundations of quantum physics with the principles governing spintronics and the behavior of nanomaterials.	1,2,8,9	-

MAGNETIC MATERIALS

[7]

Classification of magnetic materials (diamagnetic, paramagnetic, ferromagnetic, antiferromagnetic, and ferrimagnetic), magnetic susceptibility, permeability, hysteresis, and domain theory application of magnetic materials in transformers, magnetic storage devices, and spintronics.

SUPERCONDUCTING MATERIALS

[7]

Principle & Properties of superconductor, Types: Type I, Type II, High-Temperature, Organic and Heavy Fermion Superconductors – Applications: SQUID & superconducting qubits in quantum computer.

QUANTUM PHYSICS

[9]

Classical vs quantum information - Wave particle duality, de Broglie waves- Heisenberg's uncertainty principle. Wave function- normalization. Schrodinger's equation of motion: Time dependent and independent form. Particle in a box. Importance of Quantum Computing in Modern Technology - Quantum States and Superposition -The Principle of Entanglement - qubit - Bra-ket notation: $|\psi\rangle$, $\langle\psi|$. Single-qubit gates - multi-qubit gates: CNOT.

NANO MATERIALS

[7]

Classification based on dimensionality - Quantum Dots, Wires and Wells- Carbon based nano materials - graphene- Synthesis of nano materials: Top-Down Process- Mechanical Milling, Bottom -up approach – chemical (CVD) and biological method – engineering applications.

LIST OF EXPERIMENTS

[15]

1. Simulation and Analysis of PN Junction Diode V-I Characteristics.
2. Determination of band gap using semiconductor diode.
3. Thermistor: Measurement of temperature and band gap.
4. Experimental Analysis of Photodiode Characteristics
5. Determination of resistivity of metal and alloy using Carey Foster Bridge.
6. Determine the Planck's constant using Photo Electric method.
7. Generation and Initialization of a Qubit for Quantum Computation.
8. Simulation of the Quantum Double-Slit Experiment: Demonstrating Particle-Wave Duality.
9. Spintronic Device Simulation: Spin Valve / Magnetic Tunnel Junction.
10. Study of Graphene's properties.

Total Notional Hours: 90

TEST BOOKS:

1. Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar, "Engineering Physics" S. Chand Publishing, 1st Edition, 2023.
2. David A. B. Miller, "Quantum Mechanics for Scientists and Engineers" Cambridge University Press, 2008.

REFERENCE BOOKS:

1. Kuldeep Singh Kaswan, Jagjit Singh Dhatteval, Anupam Baliyan, Shalli Rani "Quantum Computing: A New Era of Computing" John Wiley & Sons, 2023.
2. J.J. Sakurai, "Modern Quantum Mechanics" Cambridge University Press, Third Edition, 2020.
3. Dietmar H. Vollath "Nanomaterials: An Introduction to Synthesis, Properties, and Applications" Wiley-VCH, (2nd Edition), 2013
4. Ashutosh Sharma and Goldie Oza "Nano chemistry: Synthesis, Characterization, and Applications", CRC Press 1st Edition, 2023.

WEB REFERENCES

1. <https://nptel.ac.in/courses/115105131>
2. <https://nptel.ac.in/courses/115101010>
3. <https://nptel.ac.in/courses/118104008>

25CH201	GREEN COMPUTING	L	T	P	C
		2	0	0	2

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Understand the fundamentals and importance of green computing in reducing environmental impact.	1, 6	-
CO2	Compare traditional and green alternatives in computing practices.	1, 6	-
CO3	Use different methods for reducing energy consumption and carbon emissions in computing environment.	1, 6	-
CO4	Apply green computing practices in hardware selection, software development, and system design to minimize ecological footprints.	1, 6	-
CO5	Practice the e-waste management measures proposed under national and global legislations.	1, 6,11	-

GREEN COMPUTING FUNDAMENTALS

[6]

Definition: Personal Computers, Data Centre, Client/Server Architecture - Power consumption of Personal Computers – Power consumption in data centres – Cloud Services - computing and climate change – correlation between energy and data transfer - Case Study.

ENERGY CONSERVATION IN COMPUTING

[8]

Basic cooling mechanism of a personal computer – CPU vs GPU – Performance of Data Centres – Carbon Footprint – Conventional Cooling – Data Centre Cooling – Air Cooling – Rear door heat exchangers – Liquid-to-chip – Single-phase immersion cooling – Advantages of immersion cooling – Case Studies: Zelendata Centar, U.S. Air Force.

E-WASTE MANAGEMENT

[8]

Types of Contamination – Treatment Strategies: Recycling, Landfill disposal, Biological Treatment – Urban mining e-waste for metals – extraction of nanometals – Lifecycle of various elements – Toxicity (Cu, Cr, Pb and Hg) – Plastics in electronics and Electrical Items.

E-WASTE MANAGEMENT PRACTICES

[8]

Practices in India – Policy comparison between developed and developing countries – Impact of e-waste on ecosystem – Phytoremediation – Electro-kinetic remediation – Classification of E-waste – Legislations for e-waste management in India.

Total Notional Hours: 60

TEXT BOOKS:

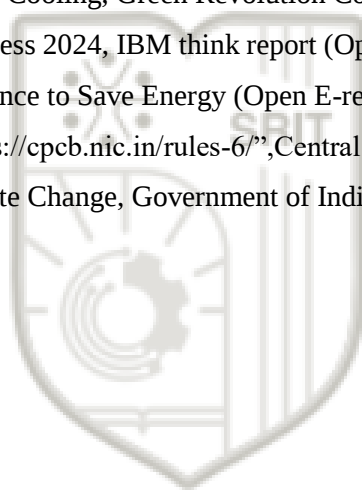
1. Sapna Jain & Hena Parveen M. Afshar Alam, "Green Computing Approach Towards Sustainable Development", I.K. International Publishing House, 2019.
2. Majeti Narasimha Vara Prasad, Meththika Vithanage, Anwasha Borthakur, "Handbook of Electronic Waste Management: International Best Practices and Case Studies", Butterworth-Heinemann, 2020.

REFERENCE BOOKS:

1. Bud. E. Smith, "Green Computing: Tools and Techniques for Saving Energy, Money, and Resources", CRC Press, 1st Edition, 2014 (2024 reprint).

WEB REFERENCES:

1. What is Green Computing? via <https://www.ibm.com/think/topics/green-computing>
2. The definitive guide to Immersion Cooling, Green Revolution Cooling (Open ebook)
3. The State of Sustainability Readiness 2024, IBM think report (Open E-resource)
4. PC Energy Report 2009, 1E, Alliance to Save Energy (Open E-resource)
5. E-waste Management Rules "https://cpcb.nic.in/rules-6", Central Pollution Control Board, Ministry of Environment, Forest and Climate Change, Government of India.



25CH202	ELECTRONIC MATERIAL SCIENCES	L	T	P	C
		2	0	0	2

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Recall the primary concerns of substrate materials used in electronics industry.	1	-
CO2	Understand the chemical aspects of industrially important substrates and advanced materials.	1, 2	-
CO3	Identify the nature of substrate materials present in the electronic component.	1, 2	-
CO4	Select the relevant coating techniques for producing various electronic components.	1, 11	-
CO5	Choose an appropriate substrate material for the manufacture of electronic devices.	1, 11	-

CHEMISTRY OF ELECTRONIC MATERIALS

[10]

Substrates-Introduction-common substrate materials used in electronics industry-Key Considerations for Substrate Materials-Compatibility with Molecules, Electrical Conductivity, Mechanical Properties, Thermal Stability, Cost and Scalability. Industrially important Flexible Substrates-Polyethylene Terephthalate, Conducting polymers, Polyimide-Graphene Oxide-Preparation, properties and applications. Advanced Materials- Silicon carbide, Aluminium nitride, Gallium nitride, Tin (IV) oxide- Preparation, properties and applications.

SEMICONDUCTOR FABRICATION TECHNIQUES

[10]

Introduction-production of electronic grade silicon-Czochralski process (CZ), Float Zone (FZ) methods and Bridgman techniques, Purification of Si and Ge for semiconductor applications. Lithography-Types of Lithography, Applications of Lithography, Thin Film Deposition Techniques-Pulsed Laser Deposition (PLD) and Atomic Layer Deposition (ALD). Epitaxy: Vapor Phase Epitaxy- Liquid Phase Epitaxy – Molecular Beam Epitaxy.

CHEMICAL PROCESS IN PCB FABRICATION

[10]

PCB substrates-Introduction-Electrical, mechanical, thermal and chemical properties-Types of PCB substrates- FR-4, Flex PCB substrates, Rigid PCB substrates and Flex-Rigid PCB substrates- Photoresists-Chemistry-types-applications. Chemical Processes in PCB Fabrication-Photolithography-Etching techniques-Ammoniacal etching, etch factor. Plating-Electroless plating – Introduction, Electroless plating of copper in the manufacture of double-sided PCB. Advanced PCBs-HDI PCBs, Microelectronic PCBs, Aerospace and Defense PCBs, controlled impedance PCBs, RF and Microwave PCBs, PCB mass production.

Total Notional Hours: 60

TEXT BOOKS:

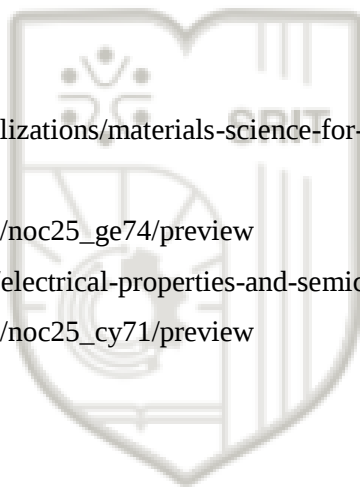
1. Andrew R Barron, “Chemistry of Electronic Materials”, Midas Green Innovations, 2021.
2. Otto Hutzinger, Stephen Safe, and Vladimir Zitko ,“The chemistry of PCB's”, CRC Press, 2017.

REFERENCE BOOKS:

1. Lesley E.Smart, Elaine A.Moore "Solid State Chemistry - an Introduction", 5th edition , CRC Press., London, 2021.
2. Hartmut Frey and Hamid R Khan, “Handbook of Thin-Film Technology”, Springer. 2015.
3. Peter Van Zant "Microchip Fabrication: A Practical Guide to Semiconductor Processing", 6th Edition, Mc Graw Hill., 2014.

WEB REFERENCES:

1. <https://www.coursera.org/specializations/materials-science-for-advanced-technological-applications>
2. https://onlinecourses.nptel.ac.in/noc25_ge74/preview
3. <https://www.coursera.org/learn/electrical-properties-and-semiconductors>
4. https://onlinecourses.nptel.ac.in/noc25_cy71/preview



25CH203	ENVIRONMENT AND SUSTAINABILITY	L	T	P	C
		2	0	0	2

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Recall the fundamental concepts of environment and sustainability.	1	-
CO2	Understand the over-exploitation of our natural resources and the need for sustainability.	1	-
CO3	Describe the importance of sustainable development.	1	-
CO4	Use different approaches for attaining environmental sustainability.	1	-
CO5	Apply sustainable practices to real-world environmental management scenarios.	1,6,11	-

ENVIRONMENT

[10]

Definition, scope and importance of environment – Components of environment - Atmosphere, lithosphere, hydrosphere and biosphere - types of environment – Natural – man – made - Environmental education-objectives, importance and scope - Need for public awareness.

CONCEPTS OF SUSTAINABILITY

[10]

Sustainability- concept, needs and challenges-from unsustainability to sustainability-millennium development goals, and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint.

SUSTAINABLE PRACTICES

[10]

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Energy Cycles carbon cycle, emission and sequestration, Electronic waste recycling : Waste Printed Circuit Board, delamination and metal recovery- Spent batteries and recovery of valuable materials from waste electrodes.

Total Notional Hours:60

TEXT BOOKS:

1. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall, 2016.
2. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 2018.

REFERENCE BOOKS:

1. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
2. Martin J Ossewaarde., Introduction to Sustainable Development, Sage Publications India Pvt. Ltd, 2018.
3. Gilbert M Masters and Wendell P Ela, Introduction to Environmental Engineering and Science, Pearson, 2022.
4. Tyler Miller, G and Scott E Spoolman, Environmental Science, Cengage learning, 2019.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning, 2016.

WEB REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc25_ge17/preview
2. https://onlinecourses.nptel.ac.in/noc25_hs86/preview
3. https://onlinecourses.nptel.ac.in/noc25_mm57/preview

25CH204	ELECTROCHEMICAL ENERGY SYSTEMS	L	T	P	C
		2	0	0	2

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Recall the fundamental concepts of various electrochemical energy systems.	1	-
CO2	Identify the key parts of electrochemical energy devices.	1	-
CO3	Understand the applications of various energy conversion technologies.	1	-
CO4	Demonstrate the working of batteries, super capacitors and fuel cells.	1, 11	-
CO5	Choose the relevant components for the fabrication of energy devices for industrial applications.	1, 11	-

BATTERIES

[12]

Fundamental concept of batteries – Characteristics-classification– primary batteries (Leclanche cell, alkaline battery and lithium battery) – secondary batteries (lead acid, Ni-Cd, Ni-metal hydride, lithium ion and sodium ion)-fabrication and working- Drone batteries-LiPo-Electric vehicles – working principle. Forms of corrosion- uniform, pitting, crevice, intergranular and stress corrosion-Corrosion protection by design, anodic and cathodic protection, corrosion inhibitors - types and applications.

SUPERCAPACITORS

[8]

Introduction-Definition-Supercapacitors-Storage principle- types of supercapacitors, cycling and performance characteristics-difference between battery and supercapacitors-Introduction-Principle and applications-Hybrid electrochemical supercapacitors.

FUEL CELLS

[10]

Fundamentals and Electrochemistry of fuel Cell- Electrode kinetics, over potential and cell polarization curve –Types – Hydrogen – Oxygen, Hydrogen air cell-Hydrocarbon air cell-Alkaline fuel cell, direct methanol-solid oxide and biofuel cells- construction, working and applications.

Total Notional Hours: 60

TEXT BOOKS:

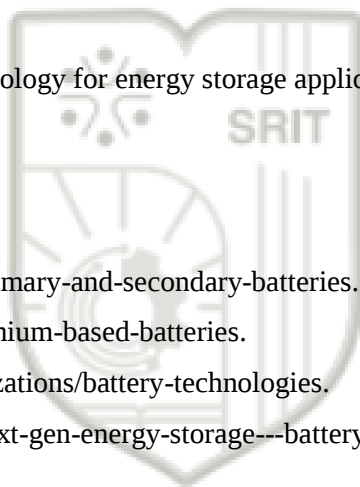
1. Sharma, R. K. Electrochemistry for energy systems (1st ed.). Narosa Publishing House, 2022.
2. Vladimir S. Bagotsky, Alexander M. Skundin, Yuriy VM. Volkovich., “Electrochemical power sources: Batteries, fuel cells and supercapacitors”, John Wiley & Sons, Inc.,2015.

REFERENCE BOOKS:

1. Beard, K.W., Linden's handbook of batteries. McGraw-Hill Education, 2019.
2. Petrovic, S., Battery Technology Crash Course, Springer International Publishing, 2021.
3. Ma, J., Battery Technologies: Materials and Components., John Wiley & Sons, 2021.
4. Electrochemical Energy Systems - Foundations, Energy Storage and Conversion, Braun, A., de Gruyter, 2018.
5. Singh, G., Advanced battery technology for energy storage applications (1st ed.). New Age International Publishers, 2019.

WEB REFERENCES:

1. <https://www.coursera.org/learn/primary-and-secondary-batteries>.
2. <https://www.coursera.org/learn/lithium-based-batteries>.
3. <https://www.coursera.org/specializations/battery-technologies>.
4. <https://www.coursera.org/learn/next-gen-energy-storage---battery-and-hydrogen-technology>.



25IT201	BIO-INSPIRED COMPUTING	L	T	P	C
		1	0	0	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Review the basic concepts of bio-inspired optimization techniques.	1,2	1
CO2	Identify the main components of human biological systems and explain their respective functions.	1,2	1
CO3	Describe Mendel's laws of inheritance, gene mapping, and the impact of mutations on genetic abnormalities.	1,2	1
CO4	Compare biological neural networks with artificial neural networks.	1,2	1
CO5	Use bio-inspired optimization algorithms for addressing engineering optimization problems.	2,3	1
CO6	Develop artificial immune system models for network security, using biological principles.	2,3	1

Bio-inspiration

[3]

Optimization and Bio-inspiration – Ant Colony – Bee colony – Particle Swarm Optimization principles – Modern Optimization techniques: Ant Lion – Dragonfly – Grey Wolf – Grasshopper – Advances in Swarm Intelligence.

Genetics

[4]

Modern and Future Genetics – Heredity and Principles of Heredity – Mendel's law of inheritance – Dominance – Independent Assortment – Segregation – Allele – Gene mapping – Gene interaction – Mitosis and Meiosis – Phenotype Mapping – Mutation and abnormalities.

Nervous System

[4]

Components of Human Nervous System – human neural network and its function – inspiration towards artificial neural networks – comparison – Perceptron model.

Immune System

[4]

Human immune system – organs, cells, immunity - functionalities – artificial immune system – network security applications.

Total Notional Hours : 30

TEXT BOOKS:

1. Annamma Odaneth, “Biology for Engineers”, All India Council for Technical Education, 2023.
2. Bibekanand Mallick, “Biology for Engineers”, McGraw-Hill, 1st Edition, 2021.

REFERENCES:

1. Seyedali Mirjalili, Jin Song Dong, Andrew Lewis, “Nature-inspired Optimizers: Theories, Literature Reviews and Applications”, Springer: Studies in Computational Intelligence, 2020.
2. Seyedali Mirjalili, “Evolutionary Algorithms and Neural Networks: Theory and Applications”, Springer: Studies in Computational Intelligence, 2019.
3. S. N. Sivanandam, S. N. Deepa, “Principles of Soft Computing”, Wiley, 2018 (2019 Reprint).



25CS251	C PROGRAMMING	L	T	P	C
		2	0	4	4

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Recall the fundamental concepts of computer organization, generations of computers, and number system representations.	1,2,5,9	1
CO2	Outline the fundamental syntax rules of C programming, such as keywords, data types, operators, and control structures.	1,5	1
CO3	Describe the operational principles of arrays, strings, functions, and pointers in C programming.	1,2,5,9	1
CO4	Summarize the structure and usage of sequential and random file access in C.	1,2,5,9	1
CO5	Develop C programs using arrays, strings, and functions to solve mathematical, scientific, and statistical problems.	1,2,5,9	1
CO6	Implement file handling and structures in C to create applications such as student record management and transaction processing systems.	2,3,5,9	1

Fundamentals of Computing

[6]

Basic concepts of computer organizations, Generation and classification of computers, Number System Representation, Fundamentals of algorithms, Pseudo code, Flow charts.

C Language Fundamentals

[6]

Introduction to C programming, Structure of a C program, Compilation and Linking Processes, Character Set, Identifiers, Keywords, Data Types, Constant and Variables, Statements, Expressions, Operators, Precedence of operators, Input-Output Operations, Control Structures, Decision Making, Branching & Looping. Application: Solving Simple Scientific and Mathematical Problems.

Arrays and Strings

[6]

Introduction to Arrays, One Dimensional Array, Multidimensional Array. Application: Matrix Operations, Sorting, Searching, Sum of Series and Statistical Problems. String Manipulation, String Arrays. Application: Solving problems using String Functions.

Functions and Pointers

[6]

User Defined and Standard Functions, Formal and Actual arguments, Function Prototypes, Parameter Passing, Call-by-Value, Call-by-Reference, Recursion. Application: Math Functions, Computation of Sine Series, Random Number Generation, Tower of Hanoi and Factorial using Recursive Functions. Pointers, Pointer Variables, Pointer Arithmetic, Passing Parameters by Reference, Pointer to Pointer, Pointers to Functions, Dynamic Memory Allocation. Application: Card shuffling and Dealing Simulation using Pointers.

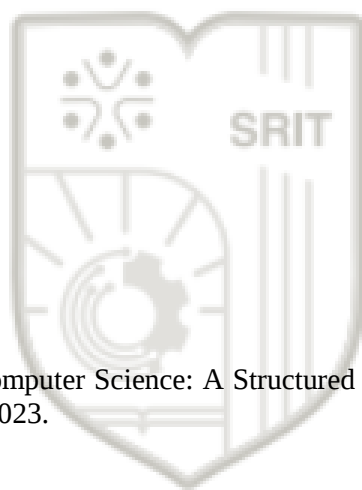
Structures, Unions and File Handling

[6]

Declaration of Structures, Nested Structure, Pointer to Structure, Declaration of Unions, Pointer to Union, Application: Student Records. Storage Classes, Pre-Processor Directives. Files -Types of File Processing: Sequential Access, Random Access. Application: Transaction Processing Program.

LAB EXPERIMENTS:**[30]**

1. Basic I/O and Operators
2. Control Statements
3. Loops and Iterations
4. Arrays
5. Strings
6. Functions
7. Pointers
8. Structures
9. Unions
10. File Handling

**Total Notional Hours: 120****TEXT BOOK:**

1. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach in C, 4th ed. Boston, MA: Cengage Learning, 2023.

REFERENCES:

1. B. S. Gottfried, Programming with C (Schaum's Outlines Series), 3rd ed. New York, NY: McGraw-Hill Education, 2011.
2. E. Balagurusamy, Programming in ANSI C, 9th ed. New Delhi, India: McGraw Hill Education, 2024.
3. P. Deitel and H. Deitel, C How to Program, 9th ed. Hoboken, NJ: Pearson Education, 2023.
4. B. W. Kernighan and D. M. Ritchie, The C Programming Language, 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1988.
5. G. Perry and D. Miller, C Programming Absolute Beginner's Guide, 3rd ed. Indianapolis, IN: Que Publishing, 2020.

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc22_cs40/
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. <https://www.programiz.com/c-programming/>

25CS270	COMPUTER PRACTICES WORKSHOP	L	T	P	C
		0	0	2	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Explain the fundamental components of computer systems and operating systems, including their functions and interactions.	1,2, 5, 9	1
CO2	Create, format, and manage professional documents using word processing software and presentations using presentation software.	3,5, 9	1
CO3	Apply spreadsheet functions (Microsoft Excel) to organize, analyze, and visualize data for practical problem-solving scenarios.	3,5, 9	1
CO4	Implement file management strategies, command line operations, and basic troubleshooting techniques to maintain efficient computer operations.	2,4, 5, 9	1

LAB EXPERIMENTS:

1. Basic components of a computer and the operating system.
2. Word processing (Microsoft word)
3. Spreadsheet and advanced excel features.
4. File management and organization
5. Command line operations (Windows or Linux)
6. Creating and formatting presentations (Microsoft PowerPoint)
7. Introduction to cloud storage and collaboration tools
8. Data analysis in Microsoft Excel
9. Basic computer security
10. Basic troubleshooting and maintenance

Total Notional Hours: 30

REFERENCES:

1. ITL Education Solutions Limited, *Introduction to Information Technology*, 3rd ed. Noida, India: Pearson Education India, 2024.
2. J. Lambert, *Microsoft Office 365 & Office 2021 Step by Step*. Redmond, WA: Microsoft Press, 2022.
3. A. Goel, *Computer Fundamentals*, 11th ed. Noida, India: Pearson Education India, 2024.

ONLINE RESOURCES:

<https://support.microsoft.com/>



25IT251	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		2	0	4	4

COURSE OUTCOMES:

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Define the fundamental concepts of Object-Oriented Programming (OOP), including its benefits, basic structure of a C++ program, and core elements like tokens, keywords, data types, and operators.	1,2, 5, 9	1
CO2	Outline the primary characteristics of classes and objects, encompassing access specifiers, constructors, destructors, and memory management operators.	1,3, 5, 9	1
CO3	Explain the principles of function and operator overloading, inheritance hierarchies, and the role of virtual functions in polymorphism.	1,2,5, 9	1
CO4	Describe the concepts of generic programming, file handling, and exception handling mechanisms in C++.	1,5,9	1
CO5	Write C++ programs using classes, objects, inheritance, and operator overloading to solve real-world problems.	3,4,5,9	1
CO6	Develop applications leveraging advanced C++ features such as virtual functions, templates, file I/O operations, and structured exception handling for robust software solutions.	3,4,5,9	1

Fundamentals of OOP and C++

[6]

Structural versus object-oriented Programming - Elements of object-oriented programming benefits of OOP – Structure of C++ program - Variables - Tokens - Keywords – Identifiers - Type modifiers - Type casting - Input and Output - Data Types and Expressions - Operators - Flow of control - Arrays, Strings and Pointers.

Classes and Objects

[6]

Classes and Objects - Class specification: Class Members, Access Specifier, Scope resolution operator- Class Instantiation - Accessing class members- Passing and returning objects - Array of objects – Constructors: Parameterized constructors - Default arguments – Copy Constructor - Constructor overloading, Destructors - new, delete operators - “this” pointer - Friend classes and friend functions.

Overloading and Inheritance

[6]

Function overloading - Operator overloading: Overloadable operators - Unary operator overloading - Binary operator overloading, Overloading the Operator Using Friend Function - Inheritance: Base class and derived class relationship - Derived class declaration - Types of inheritance - Member accessibility - Constructors in derived class.

Virtual functions and Generic Programming

[6]

Virtual Functions: Need for virtual function - Pointer to derived class objects - Pure virtual functions - Abstract classes – Virtual Destructors, Generic programming with templates: Function templates - class templates.

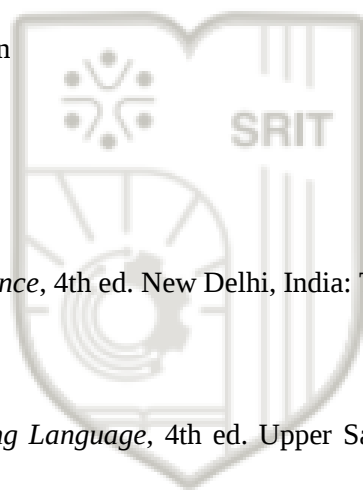
I/O Streams and Exception handling

[6]

Streams: Formatted and unformatted data – Manipulators - Files: Opening and Closing a file - File modes - File pointers and their manipulation, Sequential access to a file - Random access to a file - Reading and Writing files, Exception handling: Exception handling constructs - Handling exceptions.

LAB EXPERIMENTS:

1. Basics of C++
2. Flow Control Statements
3. Arrays, Strings & Pointers
4. Class and Object Basics
5. Constructors and Destructors
6. Array of Objects & Object Passing
7. Overloading
8. Inheritance
9. Virtual Functions and Friend Function
10. File and Exception Handling



Total Notional Hours:120

TEXT BOOK:

1. H. Schildt, *C++ The Complete Reference*, 4th ed. New Delhi, India: Tata McGraw Hill, 2017.

REFERENCES:

1. B. Stroustrup, *The C++ Programming Language*, 4th ed. Upper Saddle River, NJ: Addison-Wesley Professional, 2013.
2. P. Deitel and H. Deitel, *C++ How to Program*, 10th ed. Hoboken, NJ: Pearson Education, 2017.
3. R. Lafore, *Object-Oriented Programming in C++*, 4th ed. Indianapolis, IN: Sams Publishing, 2001.
4. S. B. Lippman, J. Lajoie, and B. E. Moo, *C++ Primer*, 5th ed. Upper Saddle River, NJ: Addison-Wesley Professional, 2012.
5. E. Balagurusamy, *Object Oriented Programming with C++*, 8th ed. New Delhi, India: McGraw Hill Education, 2021.

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc24_cs44
2. https://onlinecourses.nptel.ac.in/noc25_cs34

25EC202	DIGITAL PRINCIPLES AND SYSTEM DESIGN	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Apply number systems and Boolean algebra to design and implement combinational and sequential digital circuits using appropriate logic families.	1	1
CO2	Design digital systems by integrating simplified Boolean logic, combinational and sequential circuits, and implement them using hardware description languages and suitable digital IC and memory technologies.	1,2,8	1
CO3	Simulate and test digital circuits using Verilog HDL, integrating optimized Boolean expressions, hardware building blocks, logic family constraints, and programmable logic devices.	2,5	1
CO4	Analyze and compare the performance of digital systems based on simplification strategies, logic family characteristics, memory design, and implementation complexity in both combinational and sequential circuits.	1	1
CO5	Design and integrate complete digital systems using simplified logic, combinational and sequential modules, logic family constraints, and programmable memory for real-time applications.	2,5	1

SIMPLIFICATION OF BOOLEAN EXPRESSIONS

[9]

Number systems, Boolean expressions and Notations, Karnaugh Maps - Up to Four-variable maps, Sum of products and product of sums, Minterms and Maxterms, Minimization of Boolean Functions using Karnaugh Maps.

COMBINATIONAL CIRCUIT DESIGN

[12]

Design with basic logic gates, adders and subtractors - Verilog models. Priority encoders, decoders, Multiplexers and Demultiplexers, comparators.

LAB MODULES:

1. Design of 4-bit Binary Adder using IC 7483
2. Implementation of 4:1 Multiplexer and 1:4 Demultiplexer
3. Simulation of Encoder and Decoder

SEQUENTIAL CIRCUIT DESIGN

[12]

Memory elements and their excitation functions, SR, JK, T, and D latches and flip-flops - Verilog models, master slave JK flip-flop, edge-triggered flip-flop, synchronous and asynchronous counters.

LAB MODULES:

1. Implementation of Shift Registers using Flip-Flops
2. Simulation of Synchronous and Asynchronous Counter

LOGIC FAMILIES AND MEMORY DEVICES

[12]

Characteristics of Digital ICs, DTL, TTL, ECL, Calculation of noise margins and fan-out - Memory: Basic Organization, ROM, RAM, PROM, EPROM, EEPROM, PLDs - FPGA - Design of combinational circuits using PLDs

Total Notional Hours: 90

TEXT BOOKS:

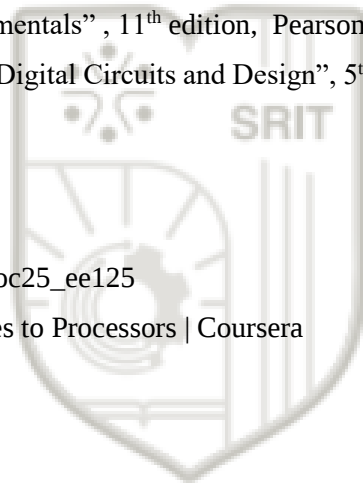
1. M. Morris Mano & Michael D. Ciletti, Digital Design, 6th Edition, Pearson Education, 2021
2. Stephen Brown & Zvonko Vranesic, Fundamentals of Digital Logic with Verilog Design, McGraw-Hill Education, 2025, 4th Edition.

REFERENCE BOOKS:

1. John F. Wakerly, Digital Design: Principles and Practices, Prentice Hall India, 2005, 4th Edition.
2. R.P. Jain & Kishor Sarawadekar, Modern Digital Electronics, McGraw-Hill Education, 5th Edition, 2022.
3. Samir Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis, Pearson Education, 2nd Edition 2003,
4. Thomas L. Floyd, “Digital Fundamentals”, 11th edition, Pearson Education, 2014
5. Salivahanan S, S.Arivaxzhagan, “Digital Circuits and Design”, 5th Edition, Oxford university Press, 2019.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_ee125
2. Digital Systems: From Logic Gates to Processors | Coursera



25CS252	DATA STRUCTURES	L	T	P	C
		2	0	2	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Review key concepts, types, and operations of linear and non-linear data structures.	1,2, 5, 9	1
CO2	Compare the implementation and uses of different list and tree structures.	1,2, 5, 9	1
CO3	Describe the working principles of graph algorithms and sorting/searching techniques.	1,2, 5, 9	1
CO4	Implement stack and queue ADTs to solve practical problems such as expression evaluation and priority-based processing.	3,5, 9	1,2
CO5	Develop applications using tree and graph data structures for problems like expression trees and network routing.	3,5, 9	1,2
CO6	Analyze and compare the efficiency of different sorting algorithms and hashing techniques for various data scenarios.	1,2, 5, 9	1,2

Linear Data structures: (List)

[6]

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operation (Insertion, Deletion, Merge, Traversal).

Linear Data structures: (Stacks-Queues)

[6]

Stack ADT – Evaluating arithmetic expressions- other applications- Queue ADT – circular queue implementation – Double ended Queues – Priority queue - applications of queues.

Non-Linear Data structures: (Trees)

[6]

Tree ADT – Tree traversals - Binary Tree ADT – expression trees – applications of trees – Binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.

Non-Linear Data structures: (Graph)

[6]

Representation of Graphs – Breadth-first search – Depth-first search – Topological sort – Minimum Spanning Trees – Kruskal and Prim algorithm – Shortest path algorithm – Dijkstra's algorithm – Bellman-Ford algorithm – Floyd - Warshall algorithm.

Sorting, Searching and Hashing Techniques.

[6]

Sorting algorithms: Insertion sort - Selection sort - Shell sort - Bubble sort - Quick sort - Merge sort - Radix sort – Searching: Linear search –Binary Search - Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendable Hashing.

LAB EXPERIMENTS:

[30]

1. Implementation of Linked List Operations.
2. Implementation of Stack using arrays and Linked list.
3. Implementation of Queue using arrays and Linked list.
4. Implementation of sorting algorithms.
5. Implementation of Linear search and Binary Search.
6. Implementation of Tree traversal Techniques.
7. Implementation of Depth for Search.
8. Implementation of Breadth first Search.
9. Implementation of Minimum Spanning Trees.
10. Implementation of Shortest Path Algorithms.

Total Notional Hours: 90

TEXT BOOKS:

1. Mark Allen Weiss, *Data structures and Algorithm Analysis in C*, 2nd Edition, Pearson Education, 2020.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, *Introduction to Algorithms*, 4th ed. Cambridge, MA, USA: MIT Press, 2022.

REFERENCES:

1. M. de Berg, O. Cheong, M. van Kreveld, and M. Overmars, *Computational Geometry: Algorithms and Applications*, 3rd ed. Berlin, Germany: Springer, 2008.
2. D. E. Knuth, *The Art of Computer Programming, Volume 1: Fundamental Algorithms*, 3rd ed. Boston, MA, USA: Addison-Wesley, 1997.
3. B. Stroustrup, *The C++ Programming Language*, 4th ed. Upper Saddle River, NJ, USA: Addison-Wesley Professional, 2013.

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc25_cs81/
2. https://onlinecourses.nptel.ac.in/noc23_cs88/

25EE201	ELECTRIC CIRCUIT ANALYSIS	L	T	P	C
		3	1	0	4

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Apply the fundamental laws and principles to analyze DC and AC electrical circuits.	1,2,5	1
CO2	Solve electric circuit problems using systematic analysis techniques and network theorems.	1,2,5	1
CO3	Analyse the dynamic response of circuits with energy storage elements and coupled systems.	1,2,5	1
CO4	Evaluate the performance characteristics of AC circuits including power analysis and resonance phenomena.	1,2,5	1
CO5	Determine the response of three-phase systems and two-port networks for practical applications.	1,2,5	1

DC CIRCUIT CONCEPTS

[12]

Electrical elements and their classification, Ohm's law, KCL, KVL, Sources- Independent and dependent sources, Source Transformation, Constant current and constant voltage systems. Series and Parallel circuits, Voltage and current division in Series and Parallel Circuits, Network Reduction

AC CIRCUIT CONCEPTS AND RESONANCE

[13]

Sinusoidal Voltage and Current, RMS Value, Form Factor, Peak Factor, Phasor representation of Sinusoidal Voltage and Current, V and I relation in R, L, C circuits, impedance and Admittance, Power Analysis: Apparent Power, Real Power, Reactive Power and Complex Power, Power Factor. Resonance: Series Resonance, Parallel resonance. Computation of Circuit parameters using circuit simulation software.

NETWORK ANALYSIS AND THEOREMS

[12]

Mesh and nodal analysis with dependent/independent Voltage and Current sources for DC and AC circuits. Theorems: Superposition theorem -Thevenin's theorem - Norton's theorem - Reciprocity and Maximum Power Transfer theorem for AC and DC circuits. Analysis of Circuits using simulation software.

TRANSIENT RESPONSE, COUPLED CIRCUITS AND TWO-PORT NETWORKS

[13]

Transient response of RL, RC and RLC Circuits using Laplace transform for source free, Step input and Sinusoidal input. Coupled circuits: Self-inductance, Mutual inductance, Coefficient of coupling, Dot Convention. Two Port Networks: Two-port network parameters, Interconnection of two-port networks, Driving point and transfer impedance/admittance.

THREE PHASE CIRCUITS

[10]

Three phase star/delta connected sources and load (Balanced & Unbalanced), Phasor representation of Voltage and Current, Star to Delta conversion and Delta to Star conversion, Power measurements in three-phase circuits.

Total Notional Hours: 120

TEXT BOOKS:

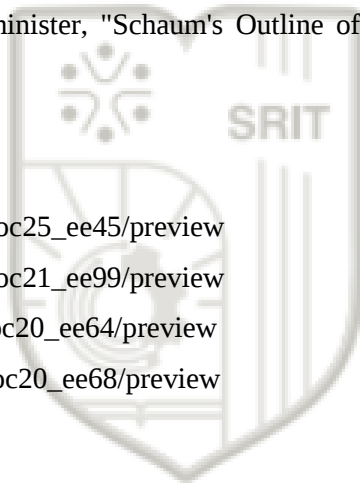
1. Charles K. Alexander and Matthew N. O. Sadiku, "Fundamentals of Electric Circuits", McGraw–Hill Companies, 7th Edition, 2022.
2. Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory", 10th Edition, Pearson, 2020

REFERENCE BOOKS:

1. R. L. Boylestad, "Introductory Circuit Analysis", Pearson Education, 14th Edition, 2023
2. J. O. Bird, "Bird's Electrical Circuit Theory and Technology", Taylor and Francis Group, 7th Edition, 2022.
3. Richard C. Dorf, James A. Svoboda, "Dorf's Introduction to Electric Circuits", Wiley, 9th Edition, 2018.
4. Mahmood Nahvi, Joseph A. Edminister, "Schaum's Outline of Electric Circuits", McGraw Hill Education, 7th Edition, 2018.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_ee45/preview
2. https://onlinecourses.nptel.ac.in/noc21_ee99/preview
3. https://onlinecourses.nptel.ac.in/noc20_ee64/preview
4. https://onlinecourses.nptel.ac.in/noc20_ee68/preview



25EE202	APPLIED ELECTRICAL AND ELECTRONICS SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Analyze DC circuit parameters to solve electrical networks using basic laws and circuit analysis techniques.	1,2,5	1
CO2	Compare the construction, operating principles, and performance characteristics of DC generators, DC motors, BLDC motors, and PMSM motors to select appropriate machines for specific applications.	1,2	1
CO3	Analyse AC circuit parameters in given single-phase circuits, and apply star-delta conversion techniques for circuit analysis.	1,2	1
CO4	Assess the construction, operation, and performance characteristics of AC machines to determine their suitability for various industrial applications.	1,2,6	1
CO5	Design basic electronic circuits using diodes and transistors, integrate sensors with microcontrollers, and develop simple automation applications using MSP430 programming for real-world engineering problems.	1,2,5	1

DC CIRCUIT FUNDAMENTALS

[10]

Ohm's Law, Kirchhoff's voltage and current laws, Equivalent resistance calculations, Mesh and nodal analysis techniques, Verification of circuit laws using software.

DC MACHINES

[7]

DC Generator – structure, operation and characteristics, DC Motor – structure, operation and characteristics. BLDC and PMSM motor- construction and operation, Performance testing of DC shunt and series motor.

AC CIRCUIT FUNDAMENTALS

[7]

AC circuits, RMS value, Average value, Form factor, Peak factor, Real power, Reactive power, Power factor, Star-delta conversion

AC MACHINES

[10]

Transformer- construction, operation and characteristics, Applications. Synchronous machines - construction, operation and characteristics, Applications. Induction machines - construction, operation and characteristics, Applications

ELECTRONIC CIRCUITS, SENSORS AND EMBEDDED SYSTEMS

[11]

Basics of Diode and Transistor, Working of Regulated Power Supply and Relays. Common sensors: temperature, pressure, position, proximity sensors - Signal conditioning and data acquisition - Basic microcontroller concepts - Interfacing sensors and actuators - Simple automation applications - Introduction to MSP430 programming using Code Composer Studio.

Total Notional Hours: 90

TEXT BOOKS:

1. Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory”, 10th Edition, Pearson, 2020
2. Sedra and Smith, “Micro Electronic Circuits”, 8th Edition, Oxford University Press, June 2020.
3. P.S.Bhimbra, “Electrical Machinery”, Fully Revised 1st Edition, Khanna Publishing House, 2021

REFERENCE BOOKS:

1. R. L. Boylestad, "Introductory Circuit Analysis", Pearson Education, 14th Edition, 2023
2. J. O. Bird, "Bird's Electrical Circuit Theory and Technology", Taylor and Francis Group, 7th Edition, 2022.
3. S.Salivahanan and N. Suresh Kumar “Electronic Devices & Circuits”, 5th Edition, Tata McGraw Hill Publishing Limited, August 2022.
4. Neamen Donald, “Semiconductor Physics and Devices- Basic Principles”, 4th Edition, McGraw Hill Publishing Limited, 2021

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_ee39/preview
2. https://onlinecourses.nptel.ac.in/noc25_ee05/preview
3. https://onlinecourses.nptel.ac.in/noc25_ee45/preview
4. https://onlinecourses.nptel.ac.in/noc21_ee99/preview
5. https://onlinecourses.nptel.ac.in/noc20_ee64/preview
6. https://onlinecourses.nptel.ac.in/noc20_ee68/preview

25EC201	SEMICONDUCTOR DEVICES	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Understand the concepts and configurations of diodes and transistors, including BJTs and MOSFETs.	1	-
CO2	Apply principles of BJTs and semiconductor diode in switching and amplifier circuit applications	1,5	2
CO3	Analyze the characteristics of Bipolar Junction Transistors, Field Effect Transistors, and special diodes to compute required parameters	2,5	2
CO4	Apply MOSFET switching principles and CMOS technology in the design of logic gates and VLSI circuits.	1,11	2
CO5	Apply basic testing methods to interpret data from diode and transistor datasheets.	1,11	-

DIODE CIRCUITS AND THEIR CHARACTERISTICS

[9]

Semiconductor diode -VI characteristics - Temperature dependence characteristics, Ideal Versus Practical Diode - static and dynamic resistance - Diode equivalent circuit - Transition and Diffusion capacitance - Switching time - Diode Data sheet - Diode testing using multimeter, Load - line analysis

DIODE APPLICATIONS

[7]

Series and Parallel diode configuration, Applications – Rectifiers with filters, Clipper, Clamper

SPECIAL DIODES

[8]

Zener diode, Varactor diode, Optical diodes - LED, LCD, Photodiode, Schottky diode, PIN Diode – Characteristics, Applications - voltage regulator circuit, Data sheet of special diodes

BIPOLAR JUNCTION TRANSISTOR

[9]

Transistor configuration – CE, CB and CC, limits of operation, configuration parameters, Transistor specification sheet, Transistor testing, Applications - switch, amplifier, phototransistor

FIELD EFFECT TRANSISTOR

[12]

Construction of JFET, specification sheet, Transfer Characteristics, Depletion and Enhancement type MOSFETs - operation, MOSFET handling, PMOS, NMOS, CMOS, MESFET, MOS capacitor charges and capacitance

Applications: Evolution of FET technology for VLSI applications, Realization of Inverter, NAND and NOR using CMOS

Total Notional Hours: 90

TEXT BOOKS:

1. Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory”, 14th Edition, Pearson, 2023
2. Sedra and Smith, Micro Electronic Circuits, 8th Edition, Oxford University Press, June 2020.

REFERENCE BOOKS:

1. Jacob. Millman, Christos C. Halkias, “Electronic Devices and Circuits”, 4th Edition, Tata McGraw Hill Publishing Limited, New Delhi, 2015.
2. David A. Bell, “Electronic Devices and Circuits”, 5th Edition, Oxford Higher Education, 2018.
3. S.Salivahanan and N. Suresh Kumar “Electronic Devices & Circuits”, 5th Edition, Tata McGraw Hill Publishing Limited, August 2022.
4. Neamen Donald, “Semiconductor Physics and Devices- Basic Principles”, 4th Edition, McGraw Hill Publishing Limited, 2021.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_ee39/preview
2. https://onlinecourses.nptel.ac.in/noc25_ee05/preview



25ME201	ENGINEERING MECHANICS	L	T	P	C
		2	1	0	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Understand and apply the fundamental concepts of force systems, free body diagrams, and moments.	1,2	1
CO2	Analyze and determine the conditions of equilibrium for coplanar force systems using appropriate theorems and methods	1,2	1
CO3	Explain the laws of dry friction and solve problems involving friction in wedges, belts, screws, and rolling resistance.	1,2	1
CO4	Describe and analyze the kinematics and kinetics of particles, including the use of Newton's second law, work-energy, and impulse-momentum principles.	1,2	1
CO5	Compute centroids and moments of inertia for simple and composite sections and understand their significance in engineering applications.	1,2	1

BASICS AND STATICS OF PARTICLES

[6+3]

Basic dimensions and units, Classification of force system, principle of transmissibility of a force, composition of forces, Free body diagrams, moment, Principle of moments, couple.

EQUILIBRIUM OF COPLANAR FORCE SYSTEM

[6+3]

Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of loadings, types of supports, Varignon's theorem, Equilibrium of Rigid bodies in two and three dimensions.

FRICTION

[6+3]

The Laws of Dry Friction, Coefficients of Friction, Description and applications of friction in wedges, thrust bearing (disk friction), belt, screw, Rolling resistance.

DYNAMICS OF PARTICLES

[6+3]

Displacement, velocity and acceleration their relationship – Rectilinear motion and Curvilinear motion – Newton's second law of motion – Work Energy Equation – Impulse and Potential Energy.

PROPERTIES OF SURFACES AND SOLIDS

[6+3]

Centroids – simple figures - composite sections - moment of inertia – moment of inertia of composite sections (T, L and I Section) – principal moment of inertia of plane areas - radius of gyration.

Total Notional Hours: 90

TEXT BOOKS:

1. Beer F. P., and Johnson Jr. E. R., “Vector Mechanics for Engineers”, McGraw Hill, 12 th Edition
Year of publication: 2024.
2. Hibbeler, R.C and Ashok Gupta, “Engineering Mechanics: Statics and Dynamics”, Pearson Education , 15th Edition , 2022.

REFERENCE BOOKS:

1. Rajasekaran S and Sankarasubramanian G., “Engineering Mechanics Statics and Dynamics”, Vikas Publishing House Pvt. Ltd., 2011.
2. Kumar, K.L., “Engineering Mechanics”, Tata McGraw–Hill Publishing Company, New Delhi 2011.
3. Antony M. Bedford and Wallace Flower, “Engineering Mechanics: Statics and Dynamics”, Pearson, 5th Edition, 2007.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_me108/preview
2. https://onlinecourses.swayam2.ac.in/aic22_ts73/preview



25EE270	ELECTRICAL WORKSHOP	L	T	P	C
		0	0	2	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Demonstrate the functions of basic electrical instruments including power supplies, function generators, digital multimeters, oscilloscopes, and power quality analyzers.	1,2,8,9	1
CO2	Measurements of electrical parameters using appropriate instruments and techniques.	1,2,8,9	1
CO3	Troubleshoot and diagnose faults in common electrical equipment including through systematic testing procedures.	1,2,6,8,9	1
CO4	Design, assemble, and test electrical circuits and systems like solar lamps, rectifiers, and general appliance wiring connections.	1,2,8,9	1
CO5	Assess and implement electrical safety protocols including proper earthing techniques, safety precautions with electrical components, and testing procedures for protective devices.	1,2,6,8,9	1

LIST OF EXPERIMENTS

1. Familiarization with power supplies, function generators, digital multimeters (DMMs), oscilloscopes (DSOs), power quality analyser
2. Testing of Fuse, MCB and Relay
3. Trouble shooting of electrical equipment- Iron Box, Fan, Mixer- Grinder
4. Measurement of Electrical Parameters (Voltage, Current, Power, Energy)
5. Familiarization of different kinds of cables and wires and Wiring of General Appliances
6. Soldering and PCB Making for Rectifier
7. Solar Lamp Assembly and Performance Testing
8. Measurement of resistance, inductance and capacitance
9. Generation and measurement of signals using CRO.
10. Earthing and Safety precautions with electrical components.

Total Notional Hours : 30

TEXT BOOKS:

1. R.P. Singh, "Electrical Workshop: A Textbook", 2nd Edition, I.K. International Publishing House, 2010
2. S.K. Kataria & Sons, "A Textbook of Electrical Workshop Practices", 1st Edition, S.K. Kataria & Sons, 2019.

REFERENCE BOOKS:

1. James W. Nilsson and Susan A. Riedel, "Electric Circuits", 11th Edition, Pearson Education, 2019.
2. A.K. Sawhney, "Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai & Co., 2021.
3. Charles R. Miller, "Ugly's Electrical Safety and NFPA 70e", 5th Edition, Jones & Bartlett Learning, 2021
4. S.C. Bhatia and R.K. Gupta, "Textbook of Renewable Energy", 1st Edition, WPI Publishing, 2019

WEB REFERENCES

1. <https://bes-iitr.vlabs.ac.in/>

25EE271	ELECTRIC CIRCUITS AND ELECTRON DEVICES LABORATORY	L	T	P	C
		0	0	2	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Construct and analyze fundamental electrical circuits using resistors, capacitors, and inductors to verify basic electrical laws and network theorems.	1,2,5,8,9	1
CO2	Build and analyze transient response circuits of RL, RC, and RLC configurations using simulation software and demonstrate circuit behavior in time domain.	1,2,5,8,9	1
CO3	Build and test three-phase power measurement circuits and analyze power parameters in balanced and unbalanced three-phase systems.	1,2,5,8,9	1
CO4	Analyze semiconductor device characteristics through experimentation with diodes, Zener regulators, and rectifier circuits.	1,2,5,8,9	1
CO5	Evaluate transistor and FET performance parameters by investigating input-output characteristics and various transistor configuration behaviors.	1,2,5,8,9	1

LIST OF EXPERIMENTS

1. Verification of Ohm's and Kirchhoff's Laws.
2. Determination of mesh current and node voltage by Mesh and Nodal Analysis.
3. Verification of Network Theorems (Thevenin's/ Super Position).
4. Transient Response of RL, RC and RLC using simulation software.
5. Measurement of three phase power.
6. Temperature Dependence of Diode Characteristics.
7. Verification of Zener Diode Characteristics as Voltage Regulator.
8. Half Wave and Full Wave Rectifier with & without Filters.
9. Verification of Input & Output Characteristics of Transistor Configurations.
10. Verification of FET Characteristics.

Total Notional Hours : 30

TEXT BOOKS:

1. Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory", 10th Edition, Pearson, 2020
2. Sedra and Smith, Micro Electronic Circuits, 8th Edition, Oxford University Press, June 2020.

REFERENCE BOOKS:

1. Jacob. Millman, Christos C. Halkias, "Electronic Devices and Circuits", 4th Edition, Tata McGraw Hill Publishing Limited, New Delhi, 2015.
2. David A. Bell, "Electronic Devices and Circuits", 5th Edition, Oxford Higher Education, 2018.
3. S.Salivahanan and N. Suresh Kumar "Electronic Devices & Circuits", 5th Edition, Tata McGraw Hill Publishing Limited, August 2022.
4. Neamen Donald, "Semiconductor Physics and Devices- Basic Principles", 4th Edition, McGraw Hill Publishing Limited, 2021

WEB REFERENCES

1. <https://bes-iitr.vlabs.ac.in/>

25EC270	ELECTRONICS ENGINEERING WORKSHOP	L	T	P	C
		0	0	2	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSOs
CO1	Operate electronic instruments such as multimeters, oscilloscopes (CRO/DSO), signal generators, and power supplies to measure electrical parameters.	1,8,9	-
CO2	Test basic electronic components including resistors, capacitors, inductors, diodes, transistors, and ICs using standard procedures.	1,8,9	-
CO3	Analyze the V-I characteristics of PN junction and Zener diodes under different biasing conditions.	2, 8,9	2
CO4	Analyze the performance of rectifier circuits by determining the ripple factor and analyzing the role of filters and voltage regulators in improving output quality	2, 8,9	2
CO5	Design digital logic circuits using basic logic gates and verify their operation using simulation tools.	1, 8,9	2
CO6	Assemble electronic circuits through soldering and interconnection techniques, and interface sensors with microcontrollers for practical applications.	2, 5, 6, 8,9,11	2,3

LIST OF EXPERIMENTS

1. Familiarization of Electronic Tools/Equipment: Multimeters, Oscilloscopes, Signal generators, Power supplies
2. Testing of Electronic components – Resistors, Inductors, Capacitors, Diodes, Transistors and ICs
3. Measurement of AC signal parameters using CRO/DSO.
4. V-I Characteristics of PN Junction Diode
5. V-I Characteristics of Zener Diode
6. Measurement of ripple factor of HWR and FWR.
7. Design of electronic circuits using logic gates: AND, OR, EX-OR, NOT, NAND and NOR.
8. Design of electronic circuits using simulation tools.
9. Inter-connection methods and soldering practice.
10. Familiarization/Identification of cables and connectors used in various Gadgets & Instruments/ Equipment.
11. Fixed voltage power supply with transformer, rectifier, filter, Zener/IC regulator.
12. Measurement of Temperature using Arduino based sensor module.

Total Notional Hours: 30



25ME270	ENGINEERING GRAPHICS	L	T	P	C
		0	0	4	2

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSOs
CO1	Recall drawing instruments, sheet layout, BIS conventions, and standard lettering and scales used in technical drawing.	1,5	1
CO2	Construct engineering curves such as ellipse, parabola, hyperbola, cycloid, and involutes using geometric methods.	1,5	1
CO3	Determine true length and inclination of lines and planes using projection methods.	1,2,5	1
CO4	Develop orthographic and sectional views of solids and interpret true shapes of sections.	1,2,5	1,2
CO5	Apply isometric and perspective projection principles to visualize and represent 3D objects through sketching and CAD tools.	1,5	1,2

INTRODUCTION

[4]

Drawing Instruments - Drawing Sheet size and Layout - BIS conventions and specifications - Lettering – Geometrical, Scales: Reducing Scale and Enlarging Scale.

PLANE GEOMETRY

[12]

Curves used in engineering practices: Conics - Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid - construction of involutes of square and circle - Drawing of tangents and normal to the above curves.

PROJECTION OF POINTS, LINES AND PLANE SURFACES

[12]

Projection of points - Projection of straight lines inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method– Projection of planes inclined to both the principal planes.

PROJECTION OF SOLIDS AND ORTHOGRAPHIC PROJECTION

[12]

Projection of simple solids, when the axis is inclined to one of the principal planes by rotating object method. Principles of Orthographic Projections, simple engineering components using first angle projection.

PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES

[12]

Sectioning of simple solids in a simple position – obtaining true shape of section. Development of lateral surfaces of simple solids.

ISOMETRIC AND PERSPECTIVE PROJECTIONS

[8]

Principles of isometric projection-isometric projections of simple solids. Introduction to Perspective projection.

Practicing by freehand sketching and CAD Software.

Total Notional Hours: 60

TEXT BOOKS:

1. Natarajan, K.V., A Textbook of Engineering Graphics, Dhanalakshmi Publishers, Chennai, 33rd Edition, 2020.
2. Venugopal, K. and Prabhu Raja, V., Engineering Graphics, New Age International (P) Limited, 15th Edition, 2018.

REFERENCE BOOKS:

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 54rd Edition, 2023.
2. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Publications, Bangalore, 2017.
3. Jolhe, D. A., Engineering drawing, Tata McGraw Hill, 2017.
4. Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2015.

WEB REFERENCES

1. https://onlinecourses.swayam2.ac.in/aic22_ts40/preview
2. https://onlinecourses.swayam2.ac.in/ntr25_ed52/preview
3. https://onlinecourses.nptel.ac.in/noc25_me173/preview

25ME271	DIGITAL HARDWARE TECHNOLOGIES	L	T	P	C
		0	0	4	2

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSOs
CO1	Demonstrate proficiency in measurement techniques and digital fabrication processes including 3D scanning, 3D printing, laser cutting, and CNC routing to create precise engineering prototypes.	1,5	1,2
CO2	Apply fundamentals of hand tools, power tools, and workshop machinery with emphasis on proper selection, safe operation, and maintenance procedures.	1,5,6	1
CO3	Master basic electronic measurement, circuit testing, and troubleshooting using multimeters and other diagnostic equipment essential for electrical engineering applications.	1,4,5	2
CO4	Develop practical skills in manufacturing processes including sheet metal fabrication, arc welding techniques, and plumbing assemblies according to industry standards.	1,5,6	1,3
CO5	Execute material manipulation techniques across various substrates including metal, wood, plastic, and composite materials with appropriate tools and joining methods.	1,5	1
CO6	Evaluate manufactured components using appropriate inspection techniques and quality control measures to ensure adherence to specifications and functional requirements.	1,4,5	1,2

1. Precision Measurement Techniques: Vernier Calipers, Micrometers, and Dial Indicators
2. Electrical Parameter Measurement and Circuit Testing with Digital Multimeters
3. 3D Scanning and Geometry Capture: From Physical Objects to Digital Models
4. Power Tool Operation and Safety: Angle Grinders, Jigsaws, and Rotary Tools
5. CNC Router Programming and 2D Profile Cutting for Press-Fit Assemblies
6. Laser Cutting and Engraving for Precision Prototype Enclosures
7. Sheet Metal Fabrication: Design and Production of Functional Dust Pans
8. Arc Welding Fundamentals: Preparation and Testing of Lap and Butt Joints
9. Household Plumbing Systems: Assembly, Testing, and Troubleshooting
10. Additive Manufacturing: FDM 3D Printing Techniques and Material Properties

Total Notional Hours: 60

TEXT BOOKS:

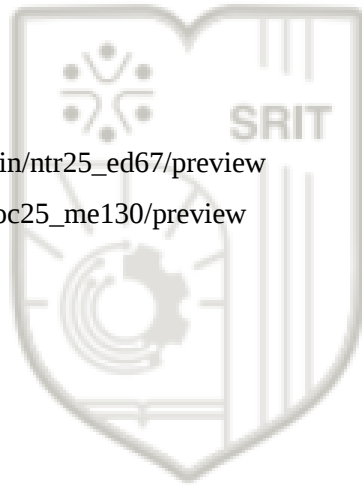
1. Practical 3D Printing for Engineers: Digital Fabrication Technologies for Rapid Prototyping" by Samira Khan and Michael R. Anderson (2024)
2. Black, Bruce. Workshop processes, practices and materials. Routledge, 2015.

REFERENCE BOOKS:

1. Digital Fabrication in Engineering Education: From Theory to Practice by Sarah Mitchell and Kai Chang (2024)
2. Scherz, Paul. Practical electronics for inventors. McGraw-Hill, Inc., 2006.
3. AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual), ISBN: 978-9391505332

WEB REFERENCES

1. https://onlinecourses.swayam2.ac.in/ntr25_ed67/preview
2. https://onlinecourses.nptel.ac.in/noc25_me130/preview



**HUMANITIES AND SOCIAL SCIENCE INCLUDING
MANAGEMENT (HSMC)**





25HS251	TECHNICAL ENGLISH	L	T	P	C
		2	0	2	3

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Understand the foundational rules of English grammar, including parts of speech, tenses, and subject-verb agreement, to ensure accuracy in both written and spoken communication.	9	-
CO2	Describe the various strategies for effective reading and listening, such as skimming, scanning, and extracting specific information from a range of texts and audio sources.	9	-
CO3	Identify key strategies for improving presentation skills, group discussions, and technical sales talks, along with their grammatical and structural requirements.	9,11	-
CO4	Apply appropriate writing strategies to compose professional documents, including formal letters, emails, resumes, and technical reports.	9,11	-
CO5	Demonstrate effective oral communication skills by delivering a self-introduction, participating in group discussions, and giving a formal presentation on a technical topic.	5,9,11	-
CO6	Interpret visual graphics and respond appropriately in professional scenarios such as a sales talk, a product description, or an interview.	5,9,11	-

IMPORTANCE OF COMMUNICATION

[6]

Reading: Reading Comprehension, Skimming and Scanning

Speaking: Self-introduction

Writing: Grammar- Parts of Speech, Tense, Subject-Verb Agreement

Listening: Listening to documentaries and interviews with celebrities.

FORMAL COMMUNICATION

[6]

Reading: Reading Newspaper and Articles, Reading for specific information.

Speaking: Describing a product/place, Conversation practice

Writing: Grammar- Present Tense, Compound Nouns, Question types: Wh./Yes or No and Tags, Paragraph

Writing, Email writing.

Listening: Listening to motivational talks / TED talks

WRITING STRATEGIES

[6]

Reading: Cloze reading

Speaking: Role-Play, Picture description.

Writing: Grammar- Past Tense, Gerunds and Infinitives, Articles, Modal Verbs, Recommendations, Checklist.

Listening: Listening to stories and event narration.

PRESENTATION SKILLS

[6]

Reading: Interpreting pictures of visual graphics.

Speaking: Group Discussion

Writing: Grammar- Future Tense, If Conditional Clause, Voices, Formal Letters (Quotations, Clarification, Placing orders & Complaint letter), SOP for conducting an event

Listening: Listening to Group Discussion and Interview Skills.

TECHNICAL COMMUNICATION

[6]

Reading: Reading advertisements and company profiles.

Speaking: Presentation on the technical topic, Sales talk.

Writing: Grammar-Purpose and Function, Prefix and Suffix, Reported Speech, Resume Writing, Report (Industrial visit reports, Accident report, Feasibility Reports).

Listening: Listening to Product description and Process

LIST OF LABORATORY EXERCISES

READING

[3]

1. Understanding short, real-world notices, messages. (Notices, messages, adverts)
2. Detailed comprehension of factual material: Skimming and scanning skills (Longer text, business reports, Product description)
3. Interpreting visual information (Graphs, Charts, Tables, etc.)

SPEAKING

[4]

4. General Conversation on Business Context
5. Giving product information and expressing opinions
6. Technical Presentation (PPT)

WRITING

[4]

7. Arranging appointments, asking for permission, giving instructions
8. Apologizing and offering compensation, dealing with requests, giving information about a product. (e mail writing, letter writing, notices)

LISTENING

[4]

9. Listening for specific information (short conversations)
10. Listening for specific information (telephonic conversation, interview discussion)

Total Notional Hours : 90

TEXT BOOKS:

1. Technical English 2nd Edition Level2 Course Book and eBook, David Bonamy, 2022
2. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition).

REFERENCE BOOKS:

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition).
2. Cambridge BEC4 Preliminary (BEC Practice Tests), Cambridge university press, 2021.

WEB REFERENCES

1. NPTEL-https://www.youtube.com/playlist?list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn.
2. https://www.youtube.com/playlist?list=PL3qvHcrYGy1sU_1nMMVrfFEhYROpQtVXV

25HS270	PROFESSIONAL ENGLISH (Common to all branches)	L	T	P	C
		0	0	2	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	PO	PSO
CO1	Identify the process of improving specific skills to be more efficient and effective to perform a task.	9	-
CO2	Understand the concept of email writing, structures of grammar and to interpret advance listening skills	5,9,11	-
CO3	Infer the strategies of academic writing using advanced grammar mechanics.	5,9,11	-
CO4	Apply different styles and techniques of communication in professional context.	5,9,11	-
CO5	Develop the skills to perform tasks more efficiently, adapt to new challenges, and achieve goals faster.	5,9,11	-

RESUME / REPORT PREPARATION / LETTER WRITING [3]

Structuring the Resume / Report – Letter Writing / E-mail Communication – Samples.

PRESENTATION SKILLS [3]

Elements of an Effective Presentation – Structure of a Presentation –Presentation Tools – Voice Modulation – Audience Analysis – Body Language.

SOFT SKILLS [3]

Time Management – Articulateness – Assertiveness – Innovation and Creativity – Stress Management & Poise.

GROUP DISCUSSION [3]

Why is GD Part of the Selection Process? – Structure of a GD- Moderator-led and Other GDs – Strategies in GD – Team Work – Body Language –Mock GD.

INTERVIEW SKILLS [3]

Kinds of Interviews –Required Key Skills – Corporate Culture- Mock Interviews.

Total Notional Hours : 30

TEXT BOOKS:

1. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2020
2. Sheetal Desarda. Master the Group Discussion & Personal Interview. Notion Press: Delhi, 2020.

REFERENCE BOOKS:

1. Butterfield, Jeff Soft Skills of Everyone. Cengage Learning: New Delhi, 2019
2. Effective Communication Skills, Khanna Publishing house, ISBN 10-82609-94-6, 2024
3. Cambridge BEC resource (Web): Cambridge English Exams IELTS Resources
4. Jack C. Richards. Cambridge Fifth Edition Interchange (with CD), 5 nd Edition, Cambridge University Press, 2021.

WEB REFERENCES

1. <https://www.youtube.com/playlist?list=PLUP07JBWJm8preRogkAN3TT0YGJVdPJuu>
2. https://www.youtube.com/playlist?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgi7KLJ



LIBERAL ARTS (LA)



25HS203	YOGA	L	T	P	C
		1	0	0	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Review the basic concepts of Yoga, such as its origins, the eightfold path, and various classifications.	6	-
CO2	Summarise the benefits of Yoga for physical and mental health.	6	-
CO3	Explain the connection between the philosophical foundations of Yoga and their influence on individual development.	6	-
CO4	Demonstrate basic Yoga postures and breathing techniques to enhance strength, endurance, and mental quietude through personalized practice.	6	-

Introduction to Yoga – Origin - Need for Yoga – Yoga Mind Power – The Yoga Tradition – Classification - Yoga’s Eightfold path – Breathing Practices – Hatha Yoga – Yoga Practice – Procedure – Personalizing Yoga Practice – Postures to Build strength and endurance – Postures to Quiet the Body and Mind – Chakras – Mudras – Mandalas – Mantras – Practices

Total Notional Hours : 30

ASSESSMENT

Grading based on Attendance and Participation

Any two asanas

Any two pranayamas

One kriya

TEXT BOOK:

Joan Budilovsky and Eve Adamson, “The Complete Idiot’s Guide to Yoga”, Alpha Books, ISBN: 0-02-863970-7, 2024.

REFERENCE:

1. Deepak Chopra and David Simon, “The Seven Spiritual Laws of Yoga: a practical guide to healing body, mind, and spirit”, John Wiley and Sons, ISBN: 0-471-64764-0, 2023.
2. Sri Swami Sivananda, “Yoga in Daily Life”, Divine Life Trust Society, ISBN: 81-7052-055-X, 2024.

25HS201	தமிழர் மரபு	L	T	P	C
		1	0	0	1

கற்றல் அடைவுகள்

பாட நெறியின் முடிவில் மாணவர்களின் கற்றலின் அடைவுகள்

COs	கற்றல் அடைவுகள்	POs	PSO
CO 1	மொழி மற்றும் இலக்கியம், சங்க இலக்கியத்தில் அறக்கோட்பாடுகள் மற்றும் தமிழ்க் காப்பியங்கள் பற்றி அறிதல்.	11	-
CO 2	பழந்தமிழரின் பாரம்பரியக் கலைகள் மற்றும் வாழ்வியல் முறைகள் குறித்து அறிந்துகொள்ளுதல்.	11	-
CO 3	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகளில் தமிழரின் பங்களிப்பு மற்றும் உறுதித்தன்மையை உணர்ந்துகொள்ளுதல்.	11	-
CO 4	தமிழர்களின் வாழ்க்கைமுறைகள், அறக்கோட்பாடு மற்றும் கல்விமுறைகள் குறித்து தெரிந்து கொள்ளுதல்.	11	-
CO 5	தமிழர்களின் கலாச்சாரத் தாக்கம்,சுயமரியாதை இயக்கம் மற்றும் தமிழ் நூல்களின் அச்ச வரலாறு குறித்து அறிந்துகொள்ளுதல்.	11	-

மொழி மற்றும் இலக்கியம்

[3]

இந்தியாவில் உள்ள மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி, தமிழின் செம்மொழித் தகுதிகள் - சங்க இலக்கியத்தின் மதச்சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம்- திருக்குறளில் மேலாண்மைக் கோட்பாடுகள் - தமிழ் காப்பியங்கள் மற்றும் தமிழில் பௌத்தம் & சமணத்தின் தாக்கம் - பக்தி இலக்கியம்,ஆழ்வார்கள் மற்றும் நாயன்மார்கள் தமிழில் நவீன இலக்கியம், வளர்ச்சி - பாரதியார் மற்றும் பாரதிதாசன் பங்களிப்பு.

பாரம்பரியம் - பாறை ஓவியங்கள் மற்றும் நவீன கலைகள் - சிற்பம்

[3]

நடுகல் முதல் நவீன சிற்பம் - வெண்கல சின்னங்கள் - பழங்குடியினர் மற்றும் அவர்களின் கைவினைப்பொருட்கள் , பொம்மைகள் -தேர்செய்யும் கலை, சுடுமண் சிற்பங்கள் - நாட்டுப்புற தெய்வங்கள், கன்னியாகுமரியில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கம், பாறை, வீணை, யாழ் மற்றும் நாதஸ்வரம் - தமிழர்களின் சமூக மற்றும் பொருளாதார வாழ்வில் கோயில்களின் பங்கு

நாட்டுப்புறக் கலைகள் மற்றும் வீரவிளையாட்டுகள்

[3]

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியன் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம்,வளரி, புலியாட்டம் - தமிழர்களின் விளையாட்டுகள்.

தமிழர்களின் இணைக்கோட்பாடுகள்

[3]

தமிழர்களின் தாவரங்கள் மற்றும் விலங்கினங்கள் -தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றியஅறக்கருத்து - சங்க காலத்தில் கல்வி மற்றும் எழுத்தறிவு - சங்ககால நகரங்கள் மற்றும் துறைமுகங்கள் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

இந்திய தேசிய இயக்கம் மற்றும் இந்தியப்பண்பாட்டிற்கு தமிழர்களின் பங்களிப்பு [3]

இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பு - இந்தியாவின் சில பகுதிகளில் தமிழர்களின் கலாச்சார தாக்கம் - சுயமரியாதை இயக்கம் - சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள் & கையெழுத்துப் பிரதிகள் - தமிழ் நூல்களின் அச்ச வரலாறு.

Total Notional Hours: 30

TEXT BOOKS:

1. தமிழர் மரபு - ஆக்கம்:தமிழ்ப் பேராசிரியர்கள் ,அண்ணா பல்கலைக்கழகம் வெளியீடு : பொறியியல் தொழில்நுட்பத் தமிழ் வளர்ச்சி மையம் ,அண்ணா பல்கலைக்கழகம் ,சென்னை - 600 025. (முதல் பதிப்பு 2023)

REFERENCE BOOKS:

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
2. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
3. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
4. Keeladi – ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
5. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
6. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
7. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.
8. தமிழக வரலாறும் மக்களும் பண்பாடும் – டாக்டர் கே.கே.பிள்ளை(தமிழ்நாடு பாடநூல் மற்றும் பணிகள் கழகம்)
9. கணினித் தமிழ் முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்)
10. கீழடி வைகை நதிக்கரையில் நகர நாகரிகம்(தொல்லியல் துறை வெளியீடு)

WEB REFERENCES:

1. <https://www.tamilvu.org/> & <https://ta.wikipedia.org/>
2. <https://it.tn.gov.in/en/node/47> & <https://www.alagappauniversity.ac.in>
3. <https://clcl.uiowa.edu/language-resources/tamil-language-and-culture-resources>
4. <https://avvaitamil.org/online-resources/>
5. <https://www.alllanguageresources.com/tamil-resources/>

25HS202	தமிழரும் தொழில்நுட்பமும்	L	T	P	C
		1	0	0	1

கற்றல் அடைவுகள்

பாட நெறியின் முடிவில் மாணவர்களின் கற்றலின் அடைவுகள்

COs	கற்றல் அடைவுகள்	POs	PSO
CO 1	நெசவு மற்றும் பானைத் தொழில்நுட்பம் பற்றி அறிதல்	11	-
CO 2	சங்க காலத்திய வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம் பற்றி அறிதல்	11	-
CO 3	இரும்பு, எஃகு மற்றும் உலோகவியல் ஆய்வுகள் குறித்து புரிந்து கொள்ளுதல்.	11	-
CO 4	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் பற்றி அறிதல்	11	-
CO 5	அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் வளர்ச்சி சார்ந்த தொழில்நுட்ப முறைகளை அறிதல்	11	-

நெசவு மற்றும் பானைத் தொழில்நுட்பம்

[3]

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு மற்றும் சிவப்பு பாத்திரங்கள் - மட்பாண்டங்கள் மீது கீரல் குறியீடு

வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம்

[3]

சங்க காலத்தில் வீட்டு உபயோகப் பொருட்களில் வடிவமைத்தல் மற்றும் கட்டமைப்பு, கட்டுமானங்கள் - கட்டிட பொருட்கள் மற்றும் சங்க காலத்து நடுகற்கள் - சிலப்பதிகாரத்தில் கட்டப்பட்ட கட்டடங்களின் விவரங்கள் மாமல்லபுரத்தில் உள்ள சிற்பங்கள் மற்றும் கோவில்கள் - சோழர்களின் பெரிய கோவில்கள் மற்றும் பிற வழிபாட்டு தலங்கள் - நாயக்கர் கால கோவில்கள் - வகை ஆய்வு (மதுரை மீனாட்சி கோயில்)- திருமலை நாயக்கர் மஹால் - செட்டி நாடு வீடுகள், ஆங்கிலேயர் காலத்தில் சென்னையில் உள்ள இந்தோ - சரசெனிக் கட்டிடக்கலை.

உற்பத்தித் தொழில்நுட்பம்

[3]

கப்பல் கட்டும் கலை - உலோகவியல் ஆய்வுகள் - இரும்புத் தொழில் - இரும்பு உருக்குதல், எஃகு - வரலாற்றின் ஆதாரமாக தாமிரம் மற்றும் தங்க நாணயங்கள் அச்சிடுதல் - மணிகள் செய்யும் தொழில்கள், கல் மணிகள் - கண்ணாடி மணிகள் - டெரகோட்டா மணிகள் - சங்கு மணிகள் / எலும்புத்துண்டுகள் தொல்பொருள் சான்றுகள் - சிலப்பதிகாரத்தில் விவரிக்கப்பட்டுள்ள மணிகள் .

வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம்

[3]

அணை, தொட்டி, குளங்கள், மதகு, சோழர் கால குமிழி தூம்பு முக்கியத்துவம், கால்நடை பராமரிப்பு - கால்நடைகள் பயன்படுத்த வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த தொழில்நுட்பம் - கடல் சார் அறிவு - மீன்வளம் - முத்து - சங்கு அறுத்தல் - கடல் பற்றிய பண்டைய அறிவு கடல் குறிப்பிட்ட அறிவு சார் உலகம்.

அறிவியல் தமிழ் & கணினி தமிழ்

[3]

அறிவியல் தமிழ் மற்றும் கணினி தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருள் உருவாக்கம் – தமிழ் மெய்நிகர் அகாடமி – தமிழ் மின்நூலகம் – இணைய தமிழ் அகராதிகள் – சொற்குவை திட்டம்.

Total Notional Hours : 30

TEXT BOOKS:

1. தமிழர் மரபு - ஆக்கம்:தமிழ்ப் பேராசிரியர்கள் ,அண்ணா பல்கலைக்கழகம் வெளியீடு : பொறியியல் தொழில்நுட்பத் தமிழ் வளர்ச்சி மையம் ,அண்ணா பல்கலைக்கழகம் ,சென்னை - 600 025. (முதல் பதிப்பு 2023)

REFERENCE BOOKS:

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
5. Keeladi – ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
7. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
8. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.
9. தமிழக வரலாறும் மக்களும் பண்பாடும் – டாக்டர் கே.கே.பிள்ளை(தமிழ்நாடு பாடநூல் மற்றும் பணிகள் கழகம்)
10. கணினித் தமிழ் முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்)
11. கீழடி வைகை நதிக்கரையில் நகர நாகரிகம்(தொல்லியல் துறை வெளியீடு)

WEB REFERENCES:

1. <https://www.tamilvu.org/> & <https://ta.wikipedia.org/>
2. <https://it.tn.gov.in/en/node/47> & <https://www.alagappauniversity.ac.in>
3. <https://clcl.uiowa.edu/language-resources/tamil-language-and-culture-resources>
4. <https://avvaitamil.org/online-resources/>
5. <https://www.alllanguageresources.com/tamil-resources/>

25MA205	VEDIC MATHEMATICS FOR ENGINEERS	L	T	P	C
		1	0	0	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Recall key Vedic Math sutras and their use in arithmetic, algebra, and number theory.	1,11	-
CO2	Understand fast computation methods for arithmetic operations and algebraic simplifications.	1,2,11	-
CO3	Apply Vedic techniques to solve engineering mathematics problems in matrices, calculus, and trigonometry.	1,2	1,2
CO4	Use Vedic methods in real-time computing scenarios such as algorithm optimization and error detection.	1,2,5	1,2
CO5	Demonstrate the benefits of Vedic computation through practical problem-solving in engineering applications.	1,2,5,11	1,2

VEDIC MATHEMATICS ESSENTIALS

[7]

Introduction to Vedic Maths & Sutras – Overview and applications - Fast Addition and Subtraction Techniques - Multiplication Tricks – Vertically and Crosswise, Duplex method - Division Shortcuts – Straight Division, Flag Method - Squares and Cubes of Numbers.

APPLICATIONS IN ENGINEERING MATHEMATICS

[7]

Solving determinants and matrices - Simplifying calculus computations (derivatives, integration shortcuts) - Trigonometric simplifications - Number theory basics useful in cryptography and coding theory

REAL-TIME APPLICATIONS AND PRACTICE

[1]

Applications in computer algorithms, digital electronics, and error checking

- Use in competitive exams: GATE, GRE, CAT, etc.
- Practice problems and speed tests
- Mini project or assignment: Implement a Vedic math-based calculator using C/C++/Python/Excel

Total Notional Hours: 30

TEXT BOOKS:

1. Bharati Krishna Tirthaji, Vedic Mathematics, Motilal Banarsidass Publishers, Latest Reprint 2022.
2. Atul Gupta, Foundation Course in Vedic Mathematics, Motilal Banarsidass Publishers, Latest Reprint 2021.
3. V. K. Jain, Engineering Applications of Vedic Mathematics, Khanna Publishing, Latest Reprint 2020.

REFERENCE BOOKS:

1. Shri Dhaval Bathia, Vedic Mathematics Made Easy, Jaico Publishing House, Reprint 2020.
2. Gaurav Tekriwal, Maths Sutra: The Art of Indian Speed Calculation, Penguin Books India, Reprint 2022.
3. K.S. Oza, Vedic Mathematics for All Ages, CBS Publishers, Reprint 2019.

WEB REFERENCES

1. NPTEL – Ancient Indian Science and Technology (Module: Vedic Mathematics)
<https://nptel.ac.in/courses/111106084>
2. Coursera – Speed Math Techniques (related to Vedic methods)
<https://www.coursera.org/learn/speed-math>
3. YouTube – Vedic Maths India Official Channel
<https://www.youtube.com/user/vedicmathsindia>
4. MIT OCW – Mental Math (complements Vedic strategies)
<https://ocw.mit.edu/high-school/mathematics/mathematics-of-everyday-life/>



25MA206	FOUNDATIONS OF PROBLEM SOLVING	L	T	P	C
		1	0	0	1

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Recall and apply mental math tricks for basic arithmetic operations.	1,11	1,2
CO2	Understand structured visual thinking methods like SAW, OX, Mirror, and High5 to solve problems.	1,2,4,11	2
CO3	Apply creative and logical thinking strategies to solve numerical and word-based puzzles.	1,2,4,11	2
CO4	Use problem-solving tools to analyze and solve real-world problems involving time, money, and work.	1,2,4	1,2
CO5	Demonstrate reflective learning and peer collaboration through group activities and challenges.	1,2,9,11	2

SPEED MATHEMATICS AND VISUAL PROBLEM SOLVING TOOLS

[7]

Quick tricks for addition, subtraction, multiplication, division - Fun number patterns and mental math hacks - Thinking fast with numbers - SAW – See, Analyze, Work: A method to break down problems clearly - OX – Options vs. Cross-checking: Strategy for choosing the best answers - Mirror – Reflective Thinking: Look back, learn, and fix errors. - High5 – 5-step method: Understand, Plan, Do, Check, Reflect.

CREATIVE THINKING TOOLS AND PROBLEM SOLVING WITH NUMBERS

[7]

Inception – Think within a problem and go deeper step by step - Minion – Use small helper ideas to solve big problems - Butterfly – See connections between unrelated ideas (lateral thinking) - Thinking logically using numbers - Puzzles, patterns, and simple number games - Word problems simplified with numbers.

REAL-TIME APPLICATIONS AND PRACTICE

[1]

- Real-world problems (time, work, money, distance).
- Mini challenges and fun math puzzles.
- Group activities and quick tests using course tools.

Total Notional Hours : 30

TEXT BOOKS:

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publications, Latest Reprint 2022.
2. Rajesh Verma, Fast Track Objective Arithmetic, Arihant Publications, Latest Reprint 2022.

REFERENCE BOOKS:

1. M. Tyra, Magical Book on Quicker Maths, BSC Publishing Co., Latest Reprint 2021
2. Arun Sharma, How to Prepare for Quantitative Aptitude for CAT, McGraw Hill Education, Latest Edition 2023.
3. Nishit K. Sinha, Logical Reasoning and Data Interpretation for CAT, Pearson Education, Latest Edition 2022.

WEB REFERENCES

1. Mental Math Tricks (YouTube) – Easy-to-follow video tutorials
<https://www.youtube.com/@mathantics>
2. Khan Academy – Arithmetic & Number Properties
<https://www.khanacademy.org/math/arithmetic>
3. Fun Math Games & Practice (Math Playground)
<https://www.mathplayground.com>
4. MindTools – Problem Solving Techniques https://www.mindtools.com/pages/main/newMN_TMC.htm
5. Project Euler – Math Puzzles and Logical Thinking
<https://projecteuler.net>
6. NRICH – Math Challenges and Games for Students
<https://nrich.maths.org>

25ME202	INDUSTRIAL REVOLUTIONS AND EMERGING TRENDS IN MANUFACTURING	L	T	P	C
		2	0	0	2

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Recall the key developments of the First, Second, Third, and Fourth Industrial Revolutions, including major inventions like the steam engine, assembly line, CNC machines, and Industry 4.0 technologies.	1,11	2
CO2	Explain the concepts of mass production, automation, and the role of mechanical engineers in transforming manufacturing.	1,6	2,3
CO3	Apply basic knowledge of CAD/CAM, CNC, and robotics in understanding how manufacturing efficiency and precision are improved in modern factories.	1,5	1,2
CO4	Analyze the transition from craftsmanship to smart factories, identifying the technological and engineering contributions that drove each industrial revolution.	2,6,11	1,2
CO5	Evaluate the advantages and challenges of Industry 4.0 including AI integration, big data utilization, and real-time decision-making in smart manufacturing environments.	2,6,10	2,3

CRAFTSMANSHIP TO MACHINES

[7]

Introduction to the First Industrial Revolution- Steam Engine and Its Impact- Industry and Mechanization- Rise of Factories- Economic and Global Effects- Criticism and Challenges.

MASS PRODUCTION

[7]

Introduction to the Second Industrial Revolution-Assembly Lines and Mass Production- Standardization of Parts- Role of Mechanical Engineers in Production- Advancements in Manufacturing Technology.

AUTOMATION IN MANUFACTURING

[8]

Introduction to the Third Industrial Revolution- Automation in Factories- Use of Computers in Manufacturing- CNC Machines -CAD/CAM Software- Advancements in Precision and Quality- Introduction of Robotics in Manufacturing.

SMART FACTORIES – INDUSTRY 4.0

[8]

Introduction to Industry 4.0- Smart and Connected Factories- Use of AI in Industry- Big Data and Real-Time Decision Making- Enhanced Factory Flexibility and Efficiency- Impact of Industry 4.0 on Production.

Total Notional Hours: 60

TEXT BOOKS:

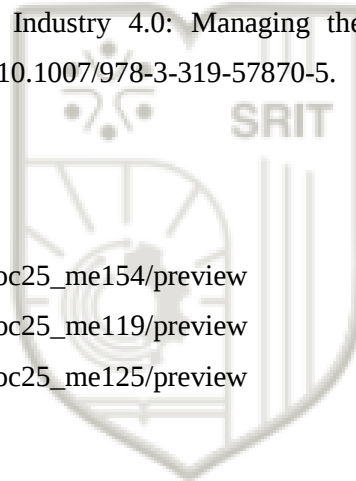
1. R. C. Allen, The Industrial Revolution: A Very Short Introduction, Oxford: Oxford University Press, 2017.
2. P. Dennis, Lean Production Simplified: A Plain-Language Guide to the World's Most Powerful Production System, 3rd New York, NY: Productivity Press, 2015.

REFERENCE BOOKS:

1. P. Clavin, Ed., The Second Industrial Revolution, 1870–1914. Oxford: Oxford University Press, 2014. M. P. Groover, Automation, Production Systems, and Computer-Integrated Manufacturing, 4th ed., Upper Saddle River, NJ: Pearson, 2015.
2. K. Schwab, The Fourth Industrial Revolution. London, UK: Penguin Books Limited, 2017.
3. A. Ustundag and E. Cevikcan, Industry 4.0: Managing the Digital Transformation. Cham, Switzerland: Springer, 2018. doi: 10.1007/978-3-319-57870-5.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc25_me154/preview
2. https://onlinecourses.nptel.ac.in/noc25_me119/preview
3. https://onlinecourses.nptel.ac.in/noc25_me125/preview



MANDATORY COURSES (MC)





25HS252	UNIVERSAL HUMAN VALUES: UNDERSTANDING HARMONY I	L	T	P	C
		1	0	0	0

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	PO	PSO
CO1	Understand the significance of values like justice, trust, and respect in human relationships and their role in fostering harmony	7,11	-
CO2	Differentiate between respect and differentiation, highlighting their impact on interpersonal relationships	7, 11	-
CO3	Apply the Universal Order and its progression from family to the world family, emphasizing the interconnectedness of relationships.	7, 11	-
CO4	Assess the presence or absence of core human values in societal structures through real-life case studies	7, 11	-
CO5	Demonstrate how the nine universal values in relationships can be applied to resolve conflicts and strengthen bonds in diverse social settings.	7, 11	-
CO6	Integrate and utilize the understanding of universal values to critically evaluate their relationships and propose ways to cultivate a more just and respectful environment within their social circles.	7, 11	-

HUMAN UNDERSTANDING: FAMILY VALUES

[15]

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) - Trust and Respect Difference between respect and differentiation; the other salient values in relationship, Universal Order- from family to world family.

Practical – Case Study on Old- Age Home and Orphanages.

Total Notional Hours: 30

TEXT BOOKS:

1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

REFERENCE BOOKS:

1. Universal Human values, Dr.Kuldeep S Sharma, Dr. Sarveen Kaur Sachdeva, Booksclinic Publisher, 2023.
2. Universal Human Values and Professional Ethics, Dr. Anand Vyas, Anandvyas publisher, 2023.

WEB REFERENCES

1. <https://www.uhv.org.in/>
2. https://www.uhv.org.in/UHV-II_Cours_Material
3. <https://uhv.org.in/highereducation>
4. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw



25HS253	UNIVERSAL HUMAN VALUES: UNDERSTANDING HARMONY II	L	T	P	C
		1	0	0	0

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	POs	PSO
CO1	Understand the interconnectedness and mutual fulfilment of four orders in nature (material, plant, animal, and human) and their role in maintaining ecological balance.	7, 11	-
CO2	Describe the principles of recyclability and self-regulation in nature, highlighting their significance in sustainability.	7, 11	-
CO3	Discuss the concept of existence as co-existence, emphasizing the interdependent relationship between all units in nature within all-pervasive space.	7, 11	-
CO4	Document the interconnectedness observed during a field visit to farms, as demonstrated through a comprehensive report.	7, 11	-
CO5	Prepare a structured report based on field observations, integrating theoretical concepts of holistic harmony with practical findings.	7, 11	-

HARMONY IN SOCIETY: NURTURING DISPOSITION

[15]

Understanding the harmony in the Nature-Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space- Holistic perception of harmony at all levels of existence.

Practical - Field trip to various farms and Report writing on field work.

Total Notional Hours: 30

TEXT BOOKS:

1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

REFERENCE BOOKS:

1. Universal Human values, Dr. Kuldeep S Sharma, Dr. Sarveen Kaur Sachdeva, Booksclinic Publisher, 2023.
2. Universal Human Values and Professional Ethics, Dr. Anand Vyas, Anandvyas publisher, 2023.

WEB REFERENCES

1. <https://www.uhv.org.in/>
2. https://www.uhv.org.in/UHV-II_Cours_Material
3. <https://uhv.org.in/highereducation>
4. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw



EMERGING TECHNOLOGY COURSES (ETC)





25IT202	MODERN DIGITAL TECHNOLOGIES	L	T	P	C
		2	0	0	2

COURSE OUTCOMES

At the end of the course, students will have the ability to:

COs	COURSE OUTCOMES	PO	PSO
CO1	Describe the fundamental concepts of digital transformation, including key technologies like cloud computing, big data, and IoT, and their evolutionary development.	1,2	1
CO2	Identify key components of digital accelerators: AI, machine learning, blockchain, and cybersecurity.	1,5	1
CO3	Explain the impact of digitalization and the internet on businesses and society, including economic and social implications.	2,6	1
CO4	Summarise elastic cloud computing architecture, its advantages, big data issues, and the shift from CapEx to OpEx models.	1,2	1
CO5	Interpret the role of AI and IoT in modern enterprises, including their strategic importance, ethical considerations, and real-world use cases.	2,4	1
CO6	Suggest solutions for digital transformation using technologies such as AI, IoT, cloud computing, or blockchain, with supporting case studies.	3,4	1

Digital Transformation

[6]

Digitalization – The Internet – Impact of Digitalization and the Internet – Evolutionary Adaptation – Modern Digital Transformation – Future of Digital Transformation.

Information Age Accelerators

[6]

Big Data - Cloud Computing – Virtualization and Containers – Multi-cloud and Hybrid Cloud – Artificial Intelligence – Machine Learning – Deep Learning – Internet of Things – AI and IoT – Model Driven Architecture.

Elastic Cloud and Big Data

[6]

Evolution of Elastic Cloud: From mainframes to Virtualization – rise of public cloud – Cloud features – Cloud Service Models – Global Public Cloud Infrastructure – CapEx to OpEx – History of Computer Storage – Data Center Storage – Evolution of Big Data – Size, Speed and Shape – Challenges of Big Data in a Modern Enterprise.

Artificial Intelligence and Internet-of-Things

[6]

The AI Renaissance – Open-Source AI software – Machine Learning – Neural Networks – Business benefits – Economic and Social impact of AI – Origin of IoT – IoT Technology Solution – Potential and Impact – IoT Use Cases – Moore's Law – Metacalfe's Law – AI in government – Strategic Role of AI – Case Studies – Responsible AI – Safety in AI systems.

Other technologies

[6]

Block chains – Consensus Mechanism – Use Case: Cryptocurrency – 3D printing – Augmented Reality – Virtual Reality – Digital Twin – Case Study: Remote Healthcare, Non-terrestrial networks – Fintech – Case Study: UPI, Digital Banking – Cyber security – Cybercrimes and Awareness.

Total Notional Hours: 60

TEXTBOOK:

1. Thomas M. Seibel, “Digital Transformation: Survive and Thrive in an Era of Mass Extinction”, Rosetta Books, 1st edition, 2019. ISBN: 9781948122481

ONLINE RESOURCE:

1. “2024 Technology Megatrends”, IEEE Future Directions accessible via [https://engage.ieee.org/FD-](https://engage.ieee.org/FD-Megatrends-2024.html)
2. Megatrends-2024.html
3. “2024 Technology Megatrends”, IEEE Future Directions accessible via [https://engage.ieee.org/FD-](https://engage.ieee.org/FD-Megatrends-2024.html)



REGULATIONS 2025

Outcome based learning through choice based credit system
(For UG students admitted from 2025-2026 and onwards)



Curriculum & Syllabus

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[Approved by AICTE New Delhi, Permanently Affiliated to Anna University, Chennai]

Website: sritcbe.ac.in