175-Dr.DHARMAMBAL GOVERNMENT

POLYTECHNIC COLLEGE FOR WOMEN

(AUTONOMOUS)

CHENNAI-600113.

AUTONOMOUS ACADEMIC

CURRICULUM

DEPARTMENT OF BASIC ENGINEERING

H- SCHEME

IMPLEMENTED FROM 2024-2025

BASIC ENGINEERING COURSE

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DWTFM HELD ON 12.9.2024

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NBA has defined the following seven POs for an Engineering diploma graduate:

PO1 **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

PO2 **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.

PO3 **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4 **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5 **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.

PO6 **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7 **Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes.

Autonomous Academic

Regulations 2024 -2025

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1. Preamble

Dharmambal Government Polytechnic College for Women, Chennai-113, was established in 1962. As many as 10 (Ten) diploma programmes are offered in this polytechnic college. Semester system is followed during the entire course of study. This institution contributes significantly to the state's talent pipeline, and it was initially started with the   primary objective of producing women skilled technicians to support mass industrialization.

Today there is an evolving manpower need, as TN's economy is beginning to focus on advanced technology and knowledge-based industries, rather than low-cost labor-intensive manufacturing. To produce future-ready talent and bridge the industry-academia gap, it is only pertinent to rethink the existing curriculum and revamp the syllabi.

The institution envisions reimagining and redefining the diploma programme to make it relevant for the ever-changing economic, industrial, and regulatory landscapes of the new era. The current dynamic ecosystem poses challenges that span across fields and demands multidisciplinary knowledge to address them. This has propelled the need for higher technical education to cover diverse areas such as STEM, arts, humanities, design, innovation, business, and entrepreneurship; hence the programme is modelled to incorporate all these areas.

The challenges of the 21st century demand young women diploma Engineers/Architects to have a command over the ever- changing body of technical knowledge along with an array of personal, interpersonal, and system-building knowledge that will prepare them with skills & competencies to address the modern-day challenges by building a new generation of machines, methods and materials.

The rapid adoption of Advanced Technologies is changing the nature of work today. Technologies such as **advanced robotics, knowledge work automation, the internet of things, cloud computing, autonomous & near-autonomous vehicles, next-generation genomics, energy storage, 3D printing, advanced materials, additive manufacturing and renewable energy** are changing industries in an unprecedented manner. These technologies are making companies become leaner and more productive and also pave the way for future technologies to be invented. This makes companies constantly look for talent that can fit into the dynamic technological environment.

The objective of the new applied-to-learn track is to train a pool of graduates who are technically competent, professionally proficient and socially responsible in quality management, regulatory compliance and manufacturing processes in the respective sectors. This is followed by an iterative process of developing the learning outcomes, aligning the learning outcomes, designing the learning activities and applying the assessment methods of the modules offered on this track in an integrated   manner   to   meet   the   industry's   needs.

The programme is offered through the core, electives, certifications, capstone projects and other ways to enable a student's transformation. Each domain is carefully crafted to cater to the diversified needs, dynamic contexts, and differentiated expectations in a learner-centric environment. The crux of this programme lies in the way experiential learning, divergent thinking, problem-solving creativity and so on are integrated into one.

1 (a) - Objective

To retain and further strengthen the quality of the human capital produced by our institution at the diploma level as the force behind the state's social, cultural, and economic pre- eminence.

1 (b) - Admission

Candidates seeking admission to the first semester of the Diploma programme should have passed the SSLC Examinations prescribed by the Government of Tamil Nadu or any examination of any other board or authority recognized by the Board of Secondary Education as equivalent thereto with eligibility for Higher Secondary Education in Tamil Nadu.

1 (c) - Lateral Entry Admission:

Engineering and Technology / Commercial Practice

The candidates who possess a pass is the HSC (Academic)or equivalent prescribed in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board, with a pass in at least three of the following subjects: Physics / Chemistry / Mathematics / Computer Science / Electronics / Information Technology / Biology / Informatics Practices / Biotechnology / Technical Vocational Subjects / Agriculture / Engineering Graphics / Business Studies / Entrepreneurship are eligible to apply for Lateral entry admission to the third semester of Diploma programmes, as per the rules fixed by the Government of Tamil Nadu. (or) The candidates who possess a pass in 2-year ITI with appropriate grade or equivalent examination.

1 (d) - Age limit:

There is no age limit prescribed for admissions to Diploma programmes.

1 (e) - Medium of Instruction:

The medium of instruction is English for all courses, examinations, seminar presentations and project work reports, except for the programmes offered in Tamil Medium.

2. Structure of the Programme

The redesigning and revamp of the Diploma programme in this institution will focus on improving the employability and entrepreneurship outcomes of the campuses through skill centric and industry allied curriculum and syllabi. The following structure is being proposed for the new curriculum.

2 (a) - Pathways for Progressive Learning Experience

The programme offers 4 different pathways for progressive learning. Entrepreneurs, Higher Education, Technocrats and Technologists have different pathways from which the students will pick one of these pathways that they find fascinating and work to ameliorate their knowledge base over the desired pathway.

There are courses offered for the specific pathways in their final semesters that will aid them to choose their career in their specific pathways. Pathway direction for the students can be assisted by faculty mentors from time to time.

- **Entrepreneur:**
  Students who aspire to transform opportunity into reality, create social and economic value for themselves and for others.
- **Higher Education:**
  Students with aspirations of pursuing higher education to acquire higher-order skills and competencies in the domain of interest.
- **Technocrats:**
  Students who aspire to acquire mastery of technical tools and methods to manage people who manage the processes.
- **Technologists:**
  Students who aspire to gain leadership in a particular discipline / technology to evolve into Problem Solvers & Innovators.

2 (b) - Various Dimensions for Transformation

Today's world is rapidly changing and increasingly interconnected, and the future talent pipeline to be sourced from the campuses needs to adapt to changes that will keep accelerating in the future. The new diploma programme focuses on equipping learners with skills that will enable them to cope with the foreseeable social and economic changes and manage often unpredictable realities. The various dimensions of transformation are designed to nurture skills towards holistic human development. Such skills are acquired not only on formal courses but in a variety of contexts throughout the academic curriculum.

Four broad dimensions of skills to ensure holistic human development:

(1) Personal, (2) Professional, (3) Interpersonal and (4) Advanced Industrial Technologies skills and competencies.
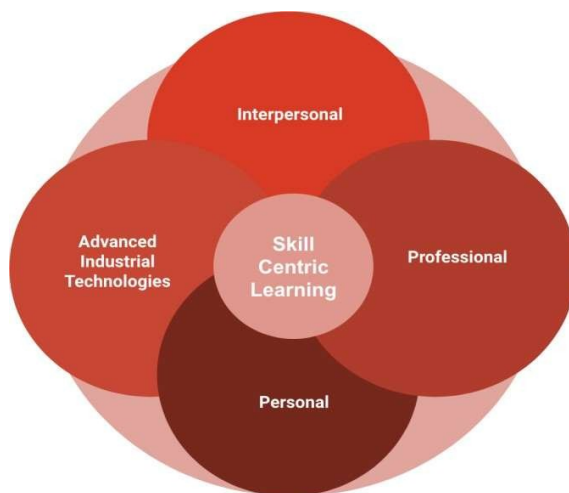
2 (c) - Integrated Curriculum

An integrated curriculum is based on learning experiences that lead to the acquisition of disciplinary knowledge and its application in a professional environment interwoven with the teaching of personal, interpersonal, and professional skills, and ways in which the integration of emerging technological skills and multidisciplinary connections are made.

Course Levels

A course is a component (a paper/subject) of a programme. All the courses need not carry the same weightage. The course should have defined Course Objectives and Course Outcomes. A course may be designed to involve lectures/tutorials/laboratory work/project work/Internships/seminars or a combination of these, to effectively meet the teaching and learning needs and the credits may be assigned suitably.

The programmes consist of various levels of courses, structured as Foundation (F), Concentration (C) and the Specialization(S) courses for a greater understanding of the core concepts of the fundamentals in the initial year of learning and thereby moving towards the specialization areas by choice.

- **Foundation (F) | Year I**: Foundation courses build strong fundamental requirements across mathematics, statistics, science, engineering domain, advanced technologies, social sciences and humanities.

- **Concentration (C) | Year II:** Concentration courses shall deliver domain-specific knowledge and technological skills. They are offered as core and electives to provide the requisite mandatory working knowledge of the chosen domain.

- **Specialisation (S) | Year III:** Specialization courses are focused on a particular area of study leading to a specific pathway. Some of the courses can also be beyond the programme, leading to skills and competencies in emerging technology domains.

Course Types

Every diploma programme shall have a curriculum with syllabi comprising Theory, Practicum and Practical courses with well-defined Programme Outcomes (PO) as per the Outcome Based Education (OBE) model.The content of each course is designed based on the intended Course Outcomes (CO). Every programme shall have a distinct curriculum with syllabi consisting of courses broadly categorized under:

- **Core (C)/Elective (E)** - Core / Elective courses are offered to students of a particular programme to gain basic and specialized knowledge/skills in a selected field. Core courses are mandatory to complete the programme and shall not be exempted or provided with credit equivalence. Elective Courses may be grouped into different domains / streams / specialisations to enable the students to have at least 3 to 5 options. Based on the student's willingness, any number of elective courses may be offered.

- **Practicum (P) -** Integrated course taught in a hands-on learning environment. This may be offered wherever theoretical concepts are to be learned simultaneously with relevant practical sessions. Such courses shall be offered only if sufficient laboratory facilities are available to conduct such courses, and both laboratory and theory components shall be considered for continuous assessment. Final evaluation based on the proportion of the credit awarded for the respective component.

- **Lab (L) -** Practical Courses taught in a designated lab. This may be offered when conceptual learning has to be augmented by practical experiments and also to bring focus on acquiring skills through doing. Such courses shall be offered only if sufficient laboratory facilities are available to conduct such courses.

- **Field Study (FS) -** Offered as a special / curriculum-enriching component to understand certain practical issues / work practices / hands-on training / immersion project / market survey. Field Study, if it forms a part of the course, then credit(s) shall be assigned accordingly. Otherwise, such course(s) may be specified in the Grade Sheet without grades.

- **Certification (Cer)** - Industry-driven course shall be offered, jointly with an industry that would result in learning the emerging trends / employment potential topics / solving real-time problems. The contents of the course shall be jointly designed by an industry expert and

a suitable faculty member, with relevant assessment and evaluation. Hybrid / Online learning options shall be available. Students are permitted to complete these courses through MOOCs / Professional Certification and credit equivalence (Programme Elective or Open Elective), to maximum of 6 credits.

- **In-House Projects (J) -** Capstone Project shall be offered once a student completes >95% of the core courses related to the Diploma programme. The Capstone Project is expected to involve concepts from fundamentals to recent developments and may be restricted to one domain or multi-domains / multi-disciplines. Capstone Project shall be offered only after completing all the fundamental courses and offered during the final semester. It shall also focus on Environment, Society, Sustainability, Entrepreneurship and Project Management. In the case of a multidisciplinary project, a suitable co-supervisor shall be opted for by the students from the relevant Department forsuccessful completion. Capstone Projectmay beoffered inphases, i.e. Phase I and Phase II (single topic or two different topics). Students are encouraged to submit the softcopy of the complete report for evaluation and abstract in the printed form during the final presentation.

- **Fellowship (Fs) -** Upto 6 months for professional and / or academic development offered by an external organisation identified and nominated by DoTE in India or abroad. Students shall be shortlisted for the same under sponsorship / scholarship by competent authorities and approved by the Head of the Institution.

- **Boot Camp (B) -** 2 to 5 days training camps for imparting knowledge and skills in emerging areas. It may be offered jointly by a team of faculty members / external experts with course content that includes interdisciplinary topics from different domains, thereby enhancing the Professional Knowledge & Skills of the students. However, such courses shall not have any significant repetition of other courses offered in that particular diploma programme. If a student fails to complete such a course on the first attempt or lacks attendance requirements, they may opt for a different course in the subsequent semester and meet the minimum credit requirements of the programme or may re-do the same course whenever offered.

- **Hackathon (H) -** 3to 6 days of problem-solving and building a solution for real-world problems in an intensive / accelerated manner. It may be considered as one of the course types in situations where multiple solutions are expected to a problem or multiple problems are expected to be solved, in a particular industry / research laboratory. Such a course shall be essentially a Practicum and may be offered in a workshop mode. Credit allocation, Assessment and Evaluation shall be based on the respective syllabi designed for the same.

- **Internship (I) -** Internship is offered as a credit course with the Industry / Research Laboratories / other Universities in India or abroad. Credit allocation, Assessment and Evaluation shall be based on the procedures given. Every student is encouraged to gain Credits through an Internship.

- **Audit Courses**are optionally registered by a student to understand certain basic / advanced concepts in his / her own discipline or other disciplines offered by the college. In this case, if a student fails in an Audit Course, it is not mandatory to repeat that course, and these courses shall not be considered for eligibility for awarding the Diploma. Grades shall be awarded as "Completed".

2 (d) Definition of Credit: Credit is a kind of weightage given to the contact periods* to teach the prescribed syllabus, which is in a modular form. The credit distribution for theory, laboratory and project courses are mentioned in the table below.

Theory (L) - 15 periods	1 credit
Tutorial (T) - 15 periods	1 credit
Practical (P) – 30 periods	1 credit
Internship (I) - 45 periods	1 credit
Project (J) - 30 periods	1 credit

* 1 period = 50 minutes of class

2 (e) - Curriculum Structure

Every programme shall have a distinct curriculum with syllabi consisting of courses broadly categorized under Basic Sciences, Basic Engineering, Professional Core, Programme Electives, Open Electives, and Certification Courses. Credit distribution for various categories of the courses will follow the guidelines given below, subject to minor variations, as may be suggested by the respective Board of Studies.

Category	Credit Range
Humanities and Social Sciences	11-17
Basic Science Courses	15-20
Engineering Sciences	6-13
Programme Core	40-51

Programme Elective	9-12
Open Elective	6-10
Industrial Training / Project Work	10-15
Health & wellness	0-1

Integrated Learning Experiences	
Induction Programme	Non-Credits Course
I&E / Club Activity / Community Initiatives	Non-Credits Course
Shop Floor Immersion	Non-Credits Course
Health & Wellness	Non-Credits Course
Student-Led Initiative	Non-Credits Course
Special Interest Groups (Placement Training)	Non-Credits Course
Emerging Technology Seminars	Non-Credits Course

Each programme will consist of Basic Science (BS), Engineering Sciences (ES), Professional Core (PC), Programme Electives (PE), Open Electives (OE), Audit Courses and In-House Project / Internships / Fellowships.

1. **Basic Sciences:** This course is common to all programmes to develop fundamental knowledge of science and mathematics; it also enhances the reasoning and analytical skills amongst students.

2. **Engineering Sciences:** Engineering Science shall create awareness of different specializations of engineering studies. The goal of these courses is to create engineers of tomorrow, who possess the knowledge of all disciplines and can apply their interdisciplinary

knowledge in every aspect. It could be any branch of engineering - Civil, Computer Science and Engineering, Electrical, Mechanical, etc.

3. **Professional Core:** This includes core courses designed in the programme, which are major courses of the discipline, are required to attain desired outcomes and to ignite critical thinking skills amongst students.

4. **Programme Elective:** This includes elective courses that can be chosen from a pool of courses which may be very specific or specialized or advanced or supportive to the programme of study or nurtures the student's proficiency / skill.

5. **Open Elective:** An elective course chosen generally from another discipline / subject, to seek interdisciplinary exposure is called an open elective. While choosing the electives, students shall ensure that they do not opt for courses with syllabus contents which are similar to that of their departmental core / elective courses.

6. **Audit Courses:** An audit course is one in which the student attends classes, does the necessary assignments and takes exams. The Institute encourages students towards extra learning by auditing for the additional number of courses. The results of audit courses shall not be considered for the prescribed "carry over courses" limit.

7. **Humanities and Social Science:** Basic courses offered across language, communication and social science subjects, including any management skills and shall be categorized as Humanities and Social Science.

8. **In-House Project / Internships / Fellowships:** Every student must do one major project in the Final year of their programme. Students can do their major project in Industry or R&D Lab or in-house or a combination of any two or a fellowship in a reputed organization.

2 (f) - Outcome-Based Education

Outcome-based education aims to create a clear expectation of results that students must achieve. Here, the outcome includes skills, knowledge and attitude. Outcomes inform both the way students are evaluated on a course and the way a course will be organised. Effective learning outcomes are student-centred, measurable, concise, meaningful, achievable and outcome-based (rather than task-based). To identify achievable learning goals and develop plans to meet them, revised Bloom's Taxonomy framework is introduced to allow educators to assess learning on an ongoing basis, encouraging students to reflect on their progress.

All the programmes offered should adopt Outcome Based Education (OBE) in order to enhance the opportunities for the students with respect to their career track (through a student-centric approach). The Programme Outcomes (POs) of the respective programme of study are achieved through the Course Outcomes (COs). Necessary remedial actions are taken at regular intervals to ensure the proper attainment of outcomes by the students. The evaluation procedures outlined are to be followed by the departments before arriving at the data for the outcome attainment analysis.

1. OBE is an approach to education in which the decisions about the curriculum instruction and assessment are driven by the learning outcomes that the students should display at the end of a programme or course.

2. The vision and mission statements are the guiding forces behind an institute / department. The vision statement provides insight into what the department focuses to achieve or become in the future. The mission statement communicates the process involved in achieving the vision. An effective vision statement should be concise, unambiguous, futuristic, and realistic, aspirational, and inspirational. Furthermore, it shouldn't be generic but rather focus on outcomes specific to the department. A good mission statement should focus on the ways to achieve the vision of the department. It should be brief, clear, informative, simple, and direct.

3. Graduate Attributes (GAs) represent the standard abilities to be looked for in a graduate of any diploma programme. They form the Programme Outcomes (POs) that reflect the skills, knowledge, and abilities of diploma graduates regardless of the field of study. At the same time, POs are necessarily independent of disciplinary knowledge; rather, these qualities may be developed in various disciplinary contexts. POs are composite statements made-up of multiple aspects relevant to a broader outcome like domain knowledge, design, analysis, etc. They also ensure the holistic development of the students by covering aspects like communication, ethics, project management, etc.,

4. Assessments are designed to measure the POs, and POs give useful guidance at the programme level for the curriculum design, delivery, and assessment of student learning. However, they represent fairly high-level generic goals that are not directly measurable. Real observability and measurability of the POs at the course level are very difficult. To connect high-level learning outcomes (POs) with course content, course outcomes and assessments are designed, they are necessary to bring further clarity and specificity to the programme outcomes.

5. For each PO, the skills and competencies implied generally require a different assessment methodology. This helps us to create a shared understanding of the competencies that students want to achieve.

6. Course Outcomes (COs) are specific, measurable statements that help the learners to understand the capabilities to be attained by them at the end of the course. COs should highlight what the learner can attain by studying the course and undergoing the evaluation of outcomes prepared for the same. It includes the knowledge to be gained, skills to be acquired and the application of the same towards solving problems specific to the context. The topics for the course should be decided based on the course outcomes in such a way that the specific topics alone do not map to the specific course outcomes.

7. Revised Bloom's Taxonomy for Assessment Design: It attempts to divide learning into three types of domains (cognitive. affective, and behavioural) and then defines the level of performance for each domain. Conscious efforts to map the curriculum and assessment to these levels can help the programmes to aim for higher-level abilities which go beyond remembering or understanding, and require application, and analysis, evaluation or creation.

8. CO-PO course articulation matrix should indicate the correlation between the CO and PO based on the extent to which the CO contributes to the PO. This is mapped at three levels 1, 2 or 3 representing low, medium and high correlation respectively. This also ensures that every PO is covered across the courses offered as a part of the programme. The matrix will be adopted for all the courses run by the department.

9. The attainment of COs of any course can be assessed from the performance of the students through continuous and final assessments. The goal of continuous assessment is to understand / realise the critical information about student comprehension throughout the learning process and provides an opportunity for the facilitator to

improve their pedagogical approach and for students to improve learning outcomes. The goal of the final assessment is to evaluate student learning outcomes at the end of the course instruction. According to the new regulation, 40% weightage is for the continuous assessment, and 60% weightage is for the final assessment.

10. The PO assessment should be carried out by both direct and indirect assessment. The assessment can be estimated by giving 80% weightage to direct assessment and 20% weightage to indirect assessment. Direct assessment is purely based on CO attainment through the course Assessment Method, and indirect assessment is through the feedback taken from the relevant stakeholders of the system. Indirect assessment can be done in the form of a graduate exit survey where the student is required to answer a questionnaire that reflects their satisfaction with respect to the attainment of POs. The questionnaire should be carefully designed as not to have the POs themselves as direct questions.

11. Each PO attainment corresponding to a specific course can be determined from the attainment values obtained for each course outcome related to that PO and the CO-PO

mapping values. The threshold value of 60%, shall be set for the POs and the same can be modified with due approval of the Authorities.

12. The gap identified in the attainment of the COs and POs can be addressed by organising talks from the industry, bridge courses, organising workshops, arranging field visits (industrial visits) with respect to the course, improving the student performance under the innovative teaching- learning process of the institution, etc.,

3. Academic and Curriculum Flexibility

Academic and curriculum flexibility enhance a student's learning experience by providing various options such as adjusting the timeframe of courses, horizontal mobility, interdisciplinary opportunities, and other benefits through curricular transactions. The types of academic and curriculum flexibilities are listed below.

1. Break of Study
2. Course Add / Drop
3. Course Withdrawal
4. Credit Equivalence
5. Credit Transfer
6. Examination Withdrawal
7. Fast-Track Option
8. Flexi-Credit System
9. Bridge Course

3 (a) - Break of Study

If a student intends to take a break / temporarily discontinue the programme in the middle of a semester / year, during the period of study, for valid reasons (such as Internships, accident or hospitalization due to prolonged ill health) and wishes to re-join the programme in the next academic year, student shall intimate stating the reasons.

Break of study is permitted only once during the entire period of the dipolmaprogramme for a maximum period of one year. The student is permitted to re-join the programme after the break and shall be governed by the rules and regulations in force, at the time of re-joining. The break shall be notified in the grade sheet. If a student is detained for want (shortage) of attendance or disciplinary issues, the period spent in that semester shall not be considered a permitted Break of Study.

3 (b) - Course Add / Drop

Subject to resource availability, a student has the option to add additional courses within a week after the regular semester begins. Furthermore, a student can drop registered courses before completing the first Continuous Assessment (CA) test in a semester, limited to a maximum of 6 credits. These dropped courses will not be considered as arrears, but the student will need to retake them when they are offered by the institution. In order to carry out these actions, students must obtain permission from the head of the institution, who will then communicate with the Chairman, Autonomous Examination.

3 (c) - Credit Equivalence

It is an option that can be exercised by a student under the following circumstances:

(i) Credits earned through Extra and Co-Curricular Activities (only against programme elective / open elective – Global)

(ii) Credits earned through online courses (only against Open Electives - Technical and Global and programme electives)

(iii) Credits accumulated through Capsule courses, One-Credit courses

Such courses and credits earned shall be presented in the Board comprising the Principal, the Head of the department and committee member along with the Equivalent Credit(s).

3 (d) - Credit Transfer

Credits earned by a student through Credit Equivalence (as said above) and credits earned by attending and completing the courses successfully, offered by other approved Universities / Institutions / Professional Bodies (only against Technical and Global Open Electives and programme electives) shall be considered as "Transferred Credits" (specified in the Grade Sheet) and considered for the calculation of CGPA.

3 (e) - Examination Withdrawal

A student may be permitted to withdraw from appearing for the end semester examination in any course or courses for valid reasons (medically unfit / unexpected family situations / sports approved by the Physical Director / HOD / Principal / DoTE). This privilege can be availed ONLY ONCE during the

entire programme. Valid documents, for medically unfit / unexpected family situations, shall be submitted by the student within seven days before the commencement of the examination in that course or courses and also recommended by the Head of the Department, approved by the Head of theInstitution / Chairman with intimation to DoTE.

Special cases under extraordinary conditions will be considered on the merit of the case if any student applies for withdrawal, notwithstanding the requirement of mandatory seven days' notice. Those students who withdraw from any course or courses during the programme are eligible for the award of first class and first class with distinction as per the requirement in this regard. Withdrawal is permitted for the end semester examinations in the final semester, only if the period of study, the student concerned, does not exceed 1 semester after the regular period of 3 years so that his eligibility for distinction is considered. The final approval for withdrawal will depend on the merit of the case and will be decided by the Head of the Institution.

3 (f) - Fast-Track

This option enables a student to complete the minimum credit requirements of a programme, to enable

      (i) her own entrepreneurial venture (start-up),

      (ii) an internship in industry / research laboratories / fellowship.

This option is currently available for students to complete the two elective papers offered in Semester 6 in advance [Recommended to be completed in Semester 4 or 5] to avail the last semester for internship / fellowship / do his own start-up / enterprise / project outside the campus. However, such an option shall not be exercised to pursue higher education elsewhere. The duration of the study shall remain the same as per the prescribed syllabi for the fast-track option also.

3 (g) - Flexi-Credit System

It offers a student to earn additional credits than that specified (minimum credits) to a programme for which student has enrolled. Such additional credits earned shall be mentioned in the Grade Sheet, as 'Additional Credits Earned'. Credits earned through Flexi-Credit System shall not be considered for the calculation of SGPA or CGPA.

3 (h) - Bridge Course

This is specifically designed for Lateral Entry (LE) students who join the Diploma Programme in 2nd year (3rd Semester). This course will be a 40 period in which the faculty gives the gist of important

topics that the LE students may have missed in the first year of the programme specific to the department concerned.

4. Integrated Learning Experience

Integrated learning experiences encompasses activities that foster the acquisition of disciplinary knowledge, personal and interpersonal skills, and technological proficiency. These experiences promote active engagement in meaningful real-life situations and establish connections between different curricula, co-curricular activities, and extracurricular pursuits across diverse disciplines. Integrated learning experiences are concatenated in the academic curriculum for each semester enabling the students to learn, adapt and transform through experiential learning pedagogy.

This approach enriches the curriculum by incorporating dynamic and up-to-date co-curricular courses and activities that may not be directly aligned with the students' programme of study. It prioritizes the holistic development of students, fostering their growth and well roundedness.

1. Innovation & Entrepreneurship
2. Peer to Peer Learning
3. Growth Lab
4. Shop Floor Immersion
5. Health & Wellness
6. Induction Programme
7. Special Interest Groups
8. Club Activity
9. Community Initiatives
10. Emerging Technology Seminars
11. Student Led Initiative
12. Industry-Specific Training

4 (a) - Innovation Track

They are offered to the student, to bring awareness on start-up / entrepreneurial ventures through a series of courses / activities. Based on the inputs gained, students can select their electives, specialisation, capstone project and deferred placement option.

4 (b) - Peer to Peer Learning

P2P learning involves interactions between students from senior classes, leading to valuable additions and deepening the understanding of certain concepts. This may happen as a part of a scheduled time-

table or after instructional hours in a day, by Peers (from senior classes), leading to value addition, enriching the understanding of certain concepts and implementing practically (developing models, prototypes, proofs-of-concept) for learning satisfaction, participating in competitions / competitive examinations. These efforts are expected to improve teamwork, communication, understanding of societal needs, project management and life-long learning activities.

4 (c) - Growth Lab

Growth lab plays an integral role to stimulate and develop a student's personality & skills in various fields of life. It also teaches about a growth mind-set to tackle real-world problems and life challenges. It brings self-confidence and empowerment to transform the inter-personality of the student. The process brings the progression to achieve higher goals in life.

4 (d) - Shop Floor Immersion

This introduces new ideas, inspires participants to further explore them on their own or may illustrate and promote actual process practice through seminars, workshops, Industrial Visits etc that results in learning hands-on skills as it gives the students an opportunity to try out new methods and fail in a safe environment.

4 (e) - Health & Wellness

This aims toteach students about various aspects of health and fitness, including exercise, nutrition, yoga, mental health, and substance awareness.

4 (f) - Induction Programme

It shall be organised to all the students, admitted into first year, to offer the course on Universal Human Value, awareness sessions on campus facilities, academic regulation and curriculum, highlight the culture, values and responsibilities of an Engineer in the Society and the Nation as a whole, besides Institutional infrastructure and facilities and student support systems. Awareness of domain-specific requirements to be organised in the second year of induction.

4 (g) - Special Interest Groups

The training is especially based on the placements on campus. Concepts required for aptitude tests, group discussions, resume building, personal interviews, industry-specific orientation and Business Case Competition are taught to the students.

4 (h) - Club Activity

A small community that attracts people who share the same interests such as music, arts, or sports working on a common goal to develop a sense of unity and teamwork, learning how to work with others in reaching the same goals

4 (i) - Community Initiatives

Community Initiatives involve activities that aim to define values, cultivate empathy, foster social skills, and enhance students' understanding of their community. Through these initiatives, students have the opportunity to build meaningful relationships, gain insights into different perspectives, and engage with diverse cultures. This engagement enables the development of crucial interpersonal skills.

4 (j) - Emerging Technology Seminars

A technical presentation made by the students & the cross-functional Members of the Faculty to showcase the technology adopted in the industry. This collaborative teaching-learning session between the student & the faculty results in a better understanding of the use of technology in various applications.

4 (k) - Student-Led Initiative

A student-led session will help students to acquire and share knowledge on emerging industrial technologies that will comprehend & introduce the emerging technology to the students. This includes student-led Tech talk series & other initiatives.

4.(l) - Industry Specific Training

Gaining information about the industry's way of working and understanding the process. This enables one to understand the various non-technical skills & competencies required for the transformation from a student to a professional.

A student is ordinarily expected to complete the Diploma programme in 6 semesters (for SSLC students) and four semesters (for Lateral Entry students) but in any case, not more than 12.

5. Duration of the Programme

Semesters for SSLC (or equivalent) students and not more than 10 semesters for Lateral Entry students.
   ❖ Each semester shall normally consist of 16 weeks with periods of 50 minutes each. The Head of the Institution shall ensure that every faculty imparts instruction as per the number of

periods specified in the syllabus and that the faculty teaches the full content of the specified syllabus for the course being taught.

❖ The Head of the Institution may conduct additional classes for improvement, special coaching, conduct model tests etc., over and above the specified periods.

❖ The End Semester Examination will normally follow immediately after the last working day of the semester as per the academic schedule prescribed from time to time.

❖ The total period for completion of the programme from the commencement of the first semester to which the student was admitted shall not exceed the maximum period specified irrespective of the period of break of study in order that student may be eligible for the award of the dipolma. The minimum and maximum period of study shall be:

Diploma programme	Min. Period	Max. Period
Full Time	3 Years	6 Years
Full Time [Lateral Entry]	2 Years	5 Years

6. Attendance Requirements

❖ A student who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester.
❖ Ideally every student is expected to attend all classes of all the courses and secure 100% attendance.
❖ However, in order to make provision for certain unavoidable reasons such as medical / participation in sports, the student is expected to attend at least 75% of the classes.

❖ Therefore, the student shall secure not less than 75% (after rounding off to the nearest integer) of overall attendance for each semester.

❖ However, a student who secures overall attendance between 65% and 74% in the current semester due to medical reasons (prolonged hospitalization / accident / specific illness) / participation in sports events may be permitted to appear for the current semester examinations, subject to the condition that the student shall submit the medical certificate / sports participation certificate attested by the Head of the Institution.

❖ Students who secure less than 65% overall attendance shall not be permitted to write the end semester examination and not permitted to move to the next semester. They are

required to repeat the incomplete semester in the next academic year, as per the norms prescribed.

❖ Students who have earned more than 50% attendance but fall short of the basic requirement of 65% attendance (in all subjects of the current semester put together) shall be permitted to proceed to the next semester, only one time during the course of study by considering all the papers in that current semester as absent and to complete the programme of study. For such students by default, the classification of class shall be second class on successful passing of course.

7. Class Committee

Every class shall have a class committee consisting of faculty of the class concerned, student representatives and a chairperson, who is not teaching the class. It is like the 'Quality Circle' (more commonly used in industries) with the overall goal of improving the teaching learning process. The functions of the class committee include:

❖ Solving problems experienced by students in the classroom and in the laboratories.
   Clarifying the regulations of the diploma programme and the details of rules therein.

❖ Informing the student representatives, the academic schedule including the dates of assessments and the syllabus coverage for each assessment.

❖ Informing the student representatives, the details of regulations regarding weightage used for each assessment. In the case of practical courses (laboratory / drawing / project work / seminar etc.) the breakup of marks for each experiment / exercise / module of work, should be clearly discussed in the class committee meeting and informed to the students.

❖ Analysing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.

❖ Identifying the slow learners, if any, and requesting the faculty concerned to provide some additional help or guidance or coaching to such students.

❖ The class committee for a class under a particular branch is normally constituted by the Head of the Department. However, if the students of different branches are mixed in a class (like the first semester which is generally common to all branches), the class committee is to be constituted by the Head of the Institution.

❖ The class committee shall be constituted within the first week of each semester. At least 4 student representatives (usually 2 boys and 2 girls) shall be included in the class committee, covering all the elective courses.

❖ The chairperson of the class committee may invite the class adviser(s) and the Head of the Department to the class committee meeting.

❖ The Head of the Institution may participate in any class committee meeting of the institution.

❖ The chairperson is required to prepare the minutes of every meeting, submit the same to the Head of the Institution within two days of the meeting and arrange to circulate it among the

students and faculty concerned. If there are some points in the minutes requiring action by the management, the same shall be brought to the notice of the Head of the Institution.

❖ The first meeting of the class committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weightage of assessments within the framework of the regulations.

❖ Two or three subsequent meetings may be held in a semester at suitable intervals.

❖ During these meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the other students of the class in order to improve the effectiveness of the teaching-learning process.

7 (a) - Course Committee for Common Courses

Each common theory course offered to more than one discipline or group, shall have a "Course Committee" comprising all the faculty teaching the common course with one of them nominated as the course coordinator. The nomination of the course coordinator shall be made by the Head of the Department / Head of the Institution depending upon whether all the faculty teaching the common course belong to a single department or to several departments. The 'Course Committee' shall meet in order to arrive at a common scheme of evaluation for the test and shall ensure a uniform evaluation of the tests. Wherever feasible, the Course Committee may also prepare a common question paper for the internal assessment test(s).

8. Assessment and Examination

❖ Performance in each course of study shall be evaluated for a maximum of 100 marks based on one of the following:

8.(a) Continuous Assessment [40%]:

❖ Every subject shall have its own framework for continuous assessment designed by the course committee and approved by the academic board as part of the curriculum. The continuous assessment shall be awarded as per the assessment proposed in respective syllabi.

❖ For one credit courses and Advanced Skill Certification programmes, no end semester examination shall be conducted, and final grade will be awarded based on continuous assessment for 100 marks.

❖ Continuous assessment shall be carried out for 40 marks as mentioned below.

ASSESSMENT FOR THEORY PAPERS				
Assessment	**Duration**	**Portions covered**	**Mark allocation**	**Reduced to**
CAT 1	2 Periods	Units I & II	30 Marks 1 Mark questions (10)->10 marks 10 Mark questions (2 out of 4) ->20 marks	15 Marks
CAT 2	2 Periods	Units III& IV	30 Marks 1 Mark questions (10)->10 marks 10 Mark questions (2 out of 4) ->20 marks	15 Marks
CAT 3 (OR) SEMINAR	1 Period During the semester	Unit V Subject/General	15 Marks 1 Mark Questions (5) -> 5Marks 10 Mark Questions (1out of 2) ->10Marks 10 Marks	10 Marks
TOTAL				**40**

ASSESSMENT FOR PRACTICUM PAPERS WITH END EXAMINATION THEORY				
Assessment	**Duration**	**Portions covered**	**Mark allocation**	**Reduced to**
CAT 1	2 Periods	Units I & II	30 Marks 1 Mark questions (10)->10 marks 10 Mark questions (2 out of 4) ->20 marks	15 Marks
		Units I & II And Activity	30 Marks Theory ->18 Marks Activity ->12 Marks	
CAT 2	2 Periods	Units III & IV	30 Marks 1 Mark questions (10)->10 marks 10 Mark questions (2 out of 4) ->20 marks	15 Marks
		Units III & IV and Activity	30 Marks Theory ->18 Marks Activity ->12 Marks	
PRACTICALS (OR) CAT 3	2Periods 1 Period	All Experiments Unit V & Activity	60 Marks 15 Marks Theory ->18 Marks Activity ->12 Marks	10 Marks
TOTAL				**40**

8.(b) End Semester Examination [60%]:

- ❖ The End Semester Examination will be conducted for 60 marks.

- ❖ The End Semester Examinations (Theory, Practical, Project) of 150 minutes duration will be conducted.

- ❖ For theory papers and practicum papers with end examination theory, the question paper will consist of two parts – Part (A) and Part (B). Part (A) carries a total of 30 marks and will have Multiple Choice Questions (MCQs), True or False questions, Match the following, Image based Multiple Choice Questions covering all the five units. Part (B) carries a total of 30 marks and students are required to answer 3 questions out of 6 questions. The six questions will be distributed across five units with each unit contributing at least one question and no unit can have more than two questions.

- ❖ For Practicum courses, the end semester examination will be conducted as a theory or a practical or a project examination based on the credits for each component, the decision on the mode of exam could be based on the recommendation by the internal committee duly forwarded and approved by Head of the Institution.

- ❖ Every practical exercise/experiment shall be evaluated based on conduct of exercise / experiment and records to be maintained, students shall submit a record work duly completed and signed by faculty in charge and the Head of the Department.

- ❖ For the Final Year project work (in-house / Industry), the Department will constitute a three-member committee consisting of head of the department, internal guide & external expert from industry to monitor the progress of the project (online/offline) and conduct reviews regularly.

- ❖ The final examination for project work will be evaluated based on the final report submitted by the project group (of not exceeding four students), and the viva voce by an external examiner.
- ❖ The split up of marks for Internal and End Semester Viva Voce can follow the below mentioned rubrics,

Internal Mark Split (40 Marks)				End Semester (60 Marks)	
Review 1 (10 Marks)	Review 2 (15 Marks)	Review 3 (15 marks)	Record / report writing (20 Marks)	Presentation (20 Marks)	Viva Voce (20 Marks)
Committee: 10 Marks	Committee: 15 Marks	Committee: 15 Marks	External: 20	External: 20	External: 20

❖ Students who are unable to complete the project work at the end of the semester can apply for an extension to the Head of the Department, with the recommendation from the project guide for a period of a maximum of one month. For those students who extend the project work for one month, Viva Voce will be carried out and results will be declared separately. If the project report is not submitted even beyond the extended time, then students are not eligible to appear for Project Viva Voce Examination.

❖ The performance of each student in the project group would be evaluated in a viva voce examination conducted by a committee consisting of an external examiner and the Department project coordinator as an internal examiner.

❖ If a student indulges in malpractice in any of the End Semester Examination / Internal Examinations, student will be liable for punitive action as prescribed by the college from time to time.

9. Pass Requirement for Award of Diploma

❖ A student who secures not less than 40% of total marks prescribed for the course [Internal Assessment + End semester Examinations] with a minimum of 40% of the marks prescribed for the end semester examination (Minimum Marks to be secured in end semester exam is 24 marks out of 60 marks for Theory Papers) shall be declared to have passed the course and acquired the relevant number of credits. This is applicable for theory subjects.

❖ A student who secures not less than 50% of total marks prescribed for the course [Internal Assessment + End semester Examinations] with a minimum of 50% of the marks prescribed for the end semester examination (Minimum Marks to be secured in end semester exam is 30 marks out of 60 marks for Practical Papers), shall be declared to have passed the course and acquired the relevant number of credits. This is applicable for theory subjects.

- ❖ No Minimum marks for continuous assessment (Internal).

- ❖ If a student fails to secure a pass in a theory course / laboratory course / elective course (same elective course), the student shall register and appear only for the end semester examination in the subsequent semester. In such cases, the internal assessment marks obtained by the student in the first appearance shall be retained and considered valid for all subsequent attempts till the student secures a pass.

- ❖ However, if a supplementary student fails to obtain pass marks (Internal Assessment + End Semester Examination), then the student shall be declared to have passed the examination if the student secures a minimum of 40% marks in theory examinations and 50% marks in Practical while appearing in the supplementary examinations.

- ❖ If any other Elective course is opted by the student, the previous registration is cancelled and henceforth it is to be considered as a new Elective course. The student has to register and attend the classes, earn the continuous assessment marks, fulfil the attendance requirements and appear for the end semester examination.

- ❖ If a student is absent during the viva - voce examination, it would be considered a failure. If a student fails to secure a pass in Project Work, the student shall be considered as supplementary student, and she should reappear for the next examination.

- ❖ A student can apply for getting the copy of her manuscripts of semester examination (theory course only), as per the guidelines of the Autonomous Examinations cell (AE) on payment of a prescribed fee along with prescribed application through the Head of the Institution.

- ❖ A student can apply for revaluation directly or after getting the copy of her manuscripts of semester examination (theory course only), as per the guidelines of the Autonomous Examinations cell (AE) on payment of a prescribed fee along with prescribed application through respective department and the Head of the Institution.
- ❖ The AE cell will arrange for the revaluation process and the results will be intimated to the student concerned through Notice Board. Revaluation is not permitted for laboratory courses and projects.

10. Award of Grades

❖ The award of letter grades will be decided using relative grading principle. The performance of a student will be reported using letter grades, each carrying certain points as detailed below:

Letter Grade	Grade Points*	Marks
S (Outstanding)	10	91-100
A (Excellent)	9	81-90
B (Very Good)	8	71-80
C (Good)	7	61-70
D (Average)	6	51-60
E (Satisfactory)	5	40-50
RA (Re-Appearance)	0	<40
SA (Shortage of Attendance)	0	0
MP (Malpractice)	-	-
WH (withheld)	-	-
W (Withdrawal)	-	-
ABSEN (Absent)	-	-

A student is deemed to have passed and acquired the corresponding credits in a particular course if the student obtains any one of the following grades: 'S', 'A', 'B', 'C', 'D', 'E'.

'SA' denotes shortage of attendance and hence prevents students from writing the end semester examinations. 'SA' will appear only in the result sheet.

"RA" denotes that the student has failed to pass in that course. "W" denotes withdrawal from the exam for the particular course. The grades RA and W will figure both in the Grade Sheet as well as in the Result Sheet. In both cases, the student has to appear for the end semester examinations as per the regulations.

If the grade RA is given to Theory Courses / Laboratory Courses, it is not required to satisfy the attendance requirements but has to appear for the end semester examination and fulfil the norms to earn a pass in the respective courses.

If the grade RA is given to courses which are evaluated only through internal assessment, the student shall register for the course again in the subsequent semester, fulfilling the norms as to earn a pass in the course. However, attendance requirements need not be satisfied.

For the Audit Course and Integrated Learning Experience, on its successful completion a 'completed' certificate will be issued by the Head of the Institution. Every student needs a minimum of 75% attendance in the Audit / Integrated Learning experience compulsorily. However, for valid reasons, the Head of the Institution may permit a student to exempt / complete this requirement in the subsequent years. Successful completion of these courses are compulsory for the award of degree. These courses will be monitored by the Head of the respective departments and Chairman. The grades S, A, B, C, D, E obtained for the one / two credit course (not the part of curriculum) shall figure in the Grade Sheet under the title 'Value Added Courses/Internship/Industrial training'.

The courses for which the grades obtained are SA will not figure in the Grade Sheet.

10 (a) - Grade Sheet

After results are declared, Grade Sheets will be issued to each student which will contain the following details: The college in which the student has studied, the list of courses registered during the semester and the grade scored. The Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of all courses enrolled from the first semester onwards. GPA for a semester is the ratio of the sum of the products of the number of credits acquired for courses and the corresponding points to the sum of the number of credits acquired for the courses in the semester. CGPA will be calculated in a similar manner, considering all the courses registered from the first semester. RA grades will be excluded for calculating GPA and CGPA.

$$CGPA = \frac{\sum_{i=1}^{n} C_i GP_i}{\sum_{i=1}^{n} C_i}$$

Where, Ci is the number of Credits assigned to the course GPi is the point corresponding to the 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.

11. Award of Diploma

A student shall be declared to be eligible for the award of the Diploma provided the student has,

❖ Successfully gained the required number of total credits as specified in the curriculum corresponding to the student's programme within the stipulated time.

❖ Successfully completed the course requirements, appeared for the end semester examinations and passed all the subjects within the period as prescribed.

❖ Successfully passed any additional courses prescribed by the autonomous examination council whenever the student is readmitted under Regulations 2024 from the earlier regulations.

❖ Successfully completed the Integrated Learning Experience requirements.

❖ No disciplinary action pending against the student.

❖ The award of Diploma must have been approved by the Autonomous Examinations Council.

12. Classification of Diploma Awarded

12 (a) - FIRST CLASS WITH DISTINCTION

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

❖ Should have passed the examination in all the courses of all the six semesters (4 semesters in the case of Lateral Entry) in the student's First Appearance. The duration of the programme shall be extended up to one additional semester in case of any withdrawals from end semester examination. Withdrawal from examination will not be considered as an appearance.

❖ Should have secured a CGPA of not less than 8.50.

❖ One-year authorized break of study (if availed of) shall be permitted within the four- year period (three years in the case of lateral entry) for award of First class with Distinction.

❖ The students should NOT have been prevented from writing the end semester examination due to lack of attendance in any semester.

12 (b) - FIRST CLASS: A student who satisfies the following conditions shall be declared to have passed the examination in First class:

❖ Should have passed the examination in all the courses in all six semesters (4 semesters in the case of Lateral Entry). The duration of the programme shall be extended upto one additional semester in case of any withdrawals from end semester examination. Withdrawal from examination will not be considered as an appearance.

❖ One-year authorized break of study (if availed of) or prevention from writing the end semester examination due to lack of attendance (if applicable) shall be provided with the duration of four years (three years in the case of lateral entry) for award of First class.

Should have secured a CGPA of not less than 6.50.

12.(c) - SECOND CLASS: All other students who qualify for the award of the degree shall be declared to have passed the examination in Second Class.

13. Discipline

Every student is expected to maintain disciplined and respectable behaviour both within and outside the college premises, refraining from engaging in any activities that may tarnish the reputation of the college.

The Head of the Institution shall constitute a disciplinary committee consisting of the Head of the Institution, Two Heads of Department of which one should be from the faculty of the student, to enquire into acts of indiscipline and notify the authorities about the disciplinary action recommended for approval.

In case of any serious disciplinary action which leads to suspension or dismissal, then a committee shall be constituted. If a student indulges in malpractice in any of the end semester examinations, student shall be liable for punitive action as prescribed by the Autonomous Examination Council from time to time. For any malpractices in any continuous assessment, the same shall be reported to the Head of the Institution for disciplinary actions.

14. Revision of Regulation, Curriculum and Syllabi

The Autonomous board may from time-to-time revise, amend or change the regulations, curriculum, syllabus and scheme of examinations through the Leadership Committee with the approval of the Board.

DR. DHARMAMBAL GOVERNMENT POLYTECNIC COLLEGE FOR WOMEN

THARAMANI, CHENNAI-113

BASIC ENGINEERING COURSE- RESTRUCTURED

CURRICULUM OUTLINE

SEMESTER-I

COURSE CODE	COURSE TITLE	L - T- P	PERIOD	CREDIT	END EXAM
BEH101	Tamil Marabu	2-0-0	30	2	Theory
BEH102	Engineering Mathematics	3-1-0	60	4	Theory
BEH103	Engineering Physics	2-0-2	60	3	Theory
BEH104	Engineering Chemistry	2-0-2	60	3	Theory
BEH171	Communicative English I	1-0-2	45	2	Practical
BEH172	Basic Workshop Practices	1-0-2	45	2	Practical
BEH173	Digital Workplace Skills	0-0-4	60	2	Practical
ASH191	Basic English for Employability	0-0-4	60	2	Practical
	Growth Lab	-	15	0	-
	Induction Program - I	-	40	0	-
	I&E/ Club Activity/ Community Initiatives	-	30	0	-
	Shop Floor Immersion	-	8	0	-
	Health & Wellness	-	30	0	-
	Student Led Initiative	**	22	0	**
TOTAL			**565***	**20**	**

*Note Test & Revision: 60 periods and Library: 15 periods

SEMESTER-II

CIVIL ENGINEERING

COURSE CODE	COURSE TITLE	L - T- P	PERIOD	CREDIT	END EXAM
BEH201	Tamil and Technology	2-0-0	30	2	Theory
CEH201	Basics of Civil Engineering	3-0-0	45	3	Theory
BEH271	Communicative English – II	1-0-2	45	2	Practical
BEH273	Applied Mathematics – I	1-0-4	75	3	Practical
BEH275	Applied Physics – I	1-0-2	45	2	Mini Project
BEH277	Applied Chemistry – I	1-0-2	45	2	Practical
BEH278	Basic Engineering Practices	1-0-2	45	2	Practical
BEH279	Drafting Practices	0-0-4	60	2	Practical
ASH292	Advanced Skills Certification - II	1-0-2	45	2	NA
	Growth Lab	**	30	0	**
	I&E/ Club Activity / Community Initiatives	**	30	0	**
	Emerging Technology Seminars	**	8	0	**
	Shop Floor Immersion	**	8	0	**
	Health & Wellness	**	30	0	**
	Student Led Initiative	**	24	0	**
TOTAL			565*	20	**

*Note (applicable for all courses) : Test & Revision: 60 periods and Library: 15 periods

Computer Engineering

COURSE CODE	COURSE TITLE	L - T- P	PERIOD	CREDIT	END EXAM
BEH201	Tamil and Technology	2-0-0	30	2	Theory
CRH201	Basics of Computer Engineering	3-0-0	45	3	Theory
BEH271	Communicative English – II	1-0-2	45	2	Practical
BEH272	Applied Mathematics – II	1-0-4	75	3	Practical
BEH274	Applied Physics – II	1-0-2	45	2	Mini Project
BEH276	Applied Chemistry – II	1-0-2	45	2	Practical
BEH278	Basic Engineering Practices	1-0-2	45	2	Practical
BEH279	Drafting Practices	0-0-4	60	2	Practical
ASH292	Advanced Skills Certification - II	1-0-2	45	2	NA
	Growth Lab	**	30	0	**
	I&E/ Club Activity / Community Initiatives	**	30	0	**
	Emerging Technology Seminars	**	8	0	**
	Shop Floor Immersion	**	8	0	**
	Health & Wellness	**	30	0	**
	Student Led Initiative	**	24	0	**
	TOTAL		**565***	**20**	****

Electronics and Communication Engineering

COURSE CODE	COURSE TITLE	L - T- P	PERIOD	CREDIT	END EXAM
BEH201	Tamil and Technology	2-0-0	30	2	Theory
ECH201	Basics of Electronics Engineering	3-0-0	45	3	Theory
BEH271	Communicative English – II	1-0-2	45	2	Practical
BEH272	Applied Mathematics – II	1-0-4	75	3	Practical
BEH274	Applied Physics – II	1-0-2	45	2	Mini Project
BEH276	Applied Chemistry – II	1-0-2	45	2	Practical
BEH278	Basic Engineering Practices	1-0-2	45	2	Practical
BEH279	Drafting Practices	0-0-4	60	2	Practical
ASH292	Advanced Skills Certification - II	1-0-2	45	2	NA
	Growth Lab	**	30	0	**
	I&E/ Club Activity / Community Initiatives	**	30	0	**
	Emerging Technology Seminars	**	8	0	**
	Shop Floor Immersion	**	8	0	**
	Health & Wellness	**	30	0	**
	Student Led Initiative	**	24	0	**
TOTAL			565*	20	**

Civil & Environmental Engineering

COURSE CODE	COURSE TITLE	L - T- P	PERIOD	CREDIT	END EXAM
BEH201	Tamil and Technology	2-0-0	30	2	Theory
EEH201	Basics of Civil and Environmental Engineering	3-0-0	45	3	Theory
BEH271	Communicative English – II	1-0-2	45	2	Practical
BEH273	Applied Mathematics – I	1-0-4	75	3	Practical
BEH275	Applied Physics – I	1-0-2	45	2	Mini Project
BEH277	Applied Chemistry – I	1-0-2	45	2	Practical
BEH278	Basic Engineering Practices	1-0-2	45	2	Practical
BEH279	Drafting Practices	0-0-4	60	2	Practical
ASH292	Advanced Skills Certification - II	1-0-2	45	2	NA
	Growth Lab	**	30	0	**
	I&E/ Club Activity / Community Initiatives	**	30	0	**
	Emerging Technology Seminars	**	8	0	**
	Shop Floor Immersion	**	8	0	**
	Health & Wellness	**	30	0	**
	Student Led Initiative	**	24	0	**
	TOTAL		565*	20	**

Instrumentation and Control Engineering

COURSE CODE	COURSE TITLE	L - T- P	PERIOD	CREDIT	END EXAM
BEH201	Tamil and Technology	2-0-0	30	2	Theory
ICH201	Basics of Electronics and Instrumentation	4-0-0	60	4	Theory
BEH271	Communicative English – II	1-0-2	45	2	Practical
BEH272	Applied Mathematics – II	1-0-4	75	3	Practical
BEH274	Applied Physics – II	1-0-2	45	2	Mini Project
BEH276	Applied Chemistry – II	1-0-2	45	2	Practical
ICH271	Basics of Electronics and Instrumentation Practical	1-0-2	45	2	Practical
BEH279	Drafting Practices	0-0-4	60	2	Practical
ASH292	Advanced Skills Certification - II	1-0-2	45	2	NA
	Growth Lab	**	30	0	**
	I&E/ Club Activity / Community Initiatives	**	30	0	**
	Emerging Technology Seminars	**	8	0	**
	Shop Floor Immersion	**	8	0	**
	Health & Wellness	**	30	0	**
	Student Led Initiative	**	24	0	**
TOTAL			565*	20	**

Garment Technology

COURSE CODE	COURSE TITLE	L - T- P	PERIOD	CREDIT	END EXAM
BEH201	Tamil and Technology	2-0-0	30	2	Theory
GTH201	Basic of Textile Technology	3-0-0	45	3	Theory
BEH271	Communicative English – II	1-0-2	45	2	Practical
BEH273	Applied Mathematics – I	1-0-4	75	3	Practical
BEH275	Applied Physics – I	1-0-2	45	2	Mini Project
BEH277	Applied Chemistry – I	1-0-2	45	2	Practical
GTH271	Apparel Machinery Engineering Practice	1-0-2	45	2	Practical
BEH279	Drafting Practices	0-0-4	60	2	Practical
ASH292	Advanced Skills Certification - II	1-0-2	45	2	NA
	Growth Lab	**	30	0	**
	I&E/ Club Activity / Community Initiatives	**	30	0	**
	Emerging Technology Seminars	**	8	0	**
	Shop Floor Immersion	**	8	0	**
	Health & Wellness	**	30	0	**
	Student Led Initiative	**	24	0	**
	TOTAL		**565***	**20**	****

Interior Decoration

COURSE CODE	COURSE TITLE	L - T- P	PERIOD	CREDIT	END EXAM
BEH201	Tamil and Technology	2-0-0	30	2	Theory
IDH201	Theory of Architecture	3-0-0	45	3	Theory
BEH271	Communicative English – II	1-0-2	45	2	Practical
BEH273	Applied Mathematics – I	1-0-4	75	3	Practical
IDH271	Basic Design & Visual Arts	1-0-2	45	2	Practical
IDH272	Architectural Drawing - I	0-0-4	60	2	Practical
BEH279	Drafting Practices	0-0-4	60	2	Practical
ASH292	Advanced Skills Certification - II	1-0-2	45	2	NA
	Growth Lab	**	30	0	**
	I&E/ Club Activity / Community Initiatives	**	30	0	**
	Emerging Technology Seminars	**	8	0	**
	Shop Floor Immersion	**	8	0	**
	Health & Wellness	**	30	0	**
	Student Led Initiative	**	24	0	**
	TOTAL		565*	20	**

SCHEME OF EXAMINATION

SEMESTER-I

COURSE CODE	COURSE NAME	HOURS PER WEEK	EXAMINATION				
			Exam duration in Hours	Internal Marks	External Marks	Max Marks	Min. Marks for Pass
BEH101	Tamil Marabu	2	2 Hrs. 30 Min.	40	60	100	40
BEH102	Engineering Mathematics	4	2 Hrs. 30 Min.	40	60	100	40
BEH103	Engineering Physics	4	2 Hrs. 30 Min.	40	60	100	40
BEH104	Engineering Chemistry	4	2 Hrs. 30 Min.	40	60	100	40
BEH171	Communicative English I	3	2 Hrs. 30 Min.	40	60	100	50
BEH172	Basic Workshop Practices	3	2 Hrs. 30 Min.	40	60	100	50
BEH173	Digital Workplace Skills	4	2 Hrs. 30 Min.	40	60	100	50
ASH191	Basic English for Employability	4	2 Hrs. 30 Min.	40	60	100	50

SEMESTER-II

All Branches (Circuit & Non Circuit)

COURSE CODE	COURSE NAME	HOURS PER WEEK	EXAMINATION				
			Exam duration in Hours	Internal Marks	External Marks	Max Marks	Min. Marks for Pass
BEH201	Tamil and Technology	2	2 Hrs. 30 Min.	40	60	100	40
BEH271	Communicative English – II	3	2 Hrs. 30 Min.	40	60	100	50
BEH278*	Basic Engineering Practices	3	2 Hrs. 30 Min.	40	60	100	50
BEH279	Drafting Practices	4	2 Hrs. 30 Min.	40	60	100	50

*Basic Engineering Practices common for all branches except ICE and GT

Non Circuit Branches

COURSE CODE	COURSE NAME	HOURS PER WEEK	EXAMINATION				
			Exam duration in Hours	Internal Marks	External Marks	Max Marks	Min. Marks for Pass
CEH201	Basics of Civil Engineering	3	2 Hrs. 30 Min.	40	60	100	40
EEH201	Basics of Civil and Environmental Engineering	3	2 Hrs. 30 Min.	40	60	100	40
GTH201	Basic of Textile Technology	3	2 Hrs. 30 Min.	40	60	100	40
IDH201	Theory of Architecture	3	2 Hrs. 30 Min.	40	60	100	40
BEH273	Applied Mathematics – I	5	2 Hrs. 30 Min.	40	60	100	50
BEH275	Applied Physics– I	3	2 Hrs. 30 Min.	40	60	100	50
BEH277	Applied Chemistry – I	3	2 Hrs. 30 Min.	40	60	100	50
GTH271	Apparel Machinery Engineering Practice	3	2 Hrs. 30 Min.	40	60	100	50
IDH271	Basic Design & Visual Arts	3	2 Hrs. 30 Min.	40	60	100	50
IDH272	Architectural Drawing - I	3	2 Hrs. 30 Min.	40	60	100	50

Circuit Branches

COURSE CODE	COURSE NAME	HOURS PER WEEK	EXAMINATION				
			Exam duration in Hours	Internal Marks	External Marks	Max Marks	Min. Marks for Pass
CRH201	Basics of Computer Engineering	3	2 Hrs. 30 Min.	40	60	100	40
ECH201	Basics of Electrical and Electronics Engineering	3	2 Hrs. 30 Min.	40	60	100	40
ICH201	Basics of Electronics and Instrumentation	4	2 Hrs. 30 Min.	40	60	100	40
BEH272	Applied Mathematics– II	5	2 Hrs. 30 Min.	40	60	100	50
BEH274	Applied Physics – II	3	2 Hrs. 30 Min.	40	60	100	50
BEH276	Applied Chemistry -II	3	2 Hrs. 30 Min.	40	60	100	50
ICH271	Basics of Electronics and Instrumentation Practical	2	2 Hrs. 30 Min.	40	60	100	50

SYLLABUS

SEMESTER I

BEH101	தமிழர் மரபு	L	T	P	C
Theory	Tamil Marabu	2	0	0	2

Introduction

This course provides an opportunity for students who have Tamil as their mother tongue and for students from other states to have multifold outcomes. Learning in the mother tongue is a key factor for inclusion and quality learning, and it also improves learning outcomes and academic performance. This is crucial, for appreciation of Tamil as a language and as a culture. It fosters mutual understanding and respect for one another and helps preserve the wealth of cultural and traditional heritage that is embedded in Tamil language around the world.

Course Objectives

The objective of this course is to enable the student to

Appreciate Tamil art, culture and literature

Learn the history and culture of Tamil language

Relate to various art forms and their relevance to development

Acknowledge the rich heritage and significant achievements of the Tamilians

Appreciate the contribution of Tamilians to nation building

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understand the significance of Tamil as a classical language

CO2: Relate the art and culture in Tamil language

CO3: Explain the importance of music, dance and martial arts that were derived from Tamil Culture

CO4: Understand the poetic mode or theme of classical language

CO5: Relate the contribution of Tamils to Nation building

Pre-requisites

Nil

BEH101	தமிழர் மரபு	L	T	P	C
Theory	**Tamil Marabu**	**2**	**0**	**0**	**2**

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		3			2		2
CO2		3			2		2
CO3		3			2		2
CO4		3			2		2
CO5		3			2		2

Legend:3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their curiosity to learn.
- Apply story telling methods to pictures the realistic situations, and real-world examples to make the sessions engaging.
- Connecting to physical spaces, renowned scholars and researchers shall help students learn from the experts.
- Throughout the course, providing pre-reading and post-reading materials/videos may help sustain the interest through class discussions and debates.

BEH101	தமிழர் மரபு	L	T	P	C
Theory	Tamil Marabu	2	0	0	2

Assessment Methodology

	Continuous Assessment Test (40marks)			End Semester Examination (60 marks)
	CAT 1	CAT 2	CAT 3 (Model)	
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

BEH101	தமிழர் மரபு	L	T	P	C
Theory	Tamil Marabu	2	0	0	2

Unit I	LANGUAGE AND LITERATURE	
Language Families in India-Dravidian Languages–Tamil as a Classical Language-Classical Literature in Tamil–Secular Nature of Sangam Literature–Distributive Justice in Sangam Literature-Management Principles in Thirukural-Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars-Forms of minor Poetry-Development of Modern literature in Tamil-Contribution of Bharathiyar and Bharathidhasan.		6
Unit II	HERITAGE -ROCKART PAINTINGS TO MODERN ART-SCULPTURE	
Hero stone to modern sculpture – Bronze icons - Tribes and their handicrafts -Art of temple carmaking-Massive Terracottas culptures, Villagedeities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils		6
Unit III	FOLK AND MARTIAL ARTS	
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tigerdance-Sports and Games of Tamils.		6
Unit IV	THINAI CONCEPT OF TAMILS	
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils-Education and Literacy during Sangam Age-Ancient Cities and Ports of Sangam Age –Export and Import during Sangam Age - Overseas Conquest of Cholas.		6
Unit V	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	
Language Families in India-Dravidian Languages–Tamilas a Classical Language-Classical Literature in Tamil–Secular Nature of Sangam Literature–Distributive Justice in Sangam Literature-Management Principles in Thirukural-Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry-Development of Modern literature in Tamil-Contribution of Bharathiyar and Bharathidhasan.		6
TOTAL HOURS		30

BEH101	தமிழர் மரபு	L	T	P	C
Theory	**Tamil Marabu**	**2**	**0**	**0**	**2**

Suggested List of Students Activity

- A team activity to prepare a poster on any one module
- An elocution competition in the class for 3 minutes on any particular topic/any topic from the syllabi
- An essay writing on the topic of interest

Text Books

- தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை [வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்]
- கணினித் தமிழ் - முனைவர் இல. சுந்தரம் [விகடன் பிரசுரம்]
- கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் [தொல்லியல் துறை வெளியீடு]
- பொருநை - ஆற்றங்கரை நாகரிகம் [தொல்லியல் துறை வெளியீடு]
- Social Life of Tamils [Dr.K.L. 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]
- Historical Heritage of the Tamils [Dr.S.V. Subataramanian, Dr.K.D. Thirunavukkarasu] [Published by: International Institute of Tamil Studies]
- The Contributions of the Tamils to Indian Culture [Dr.M. Valarmathi] [Published by: International Institute of Tamil Studies]
- Keeladi – 'Sangam City Civilization on the banks of river Vaigai' [Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services]
- Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K. Pillay) (Published by: The Author)

Reference

- Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

- Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Publishedby:RMRL) – Reference Book.

BEH102	**Engineering Mathematics**	L	T	P	C
Theory		3	1	0	4

Introduction

This course is designed to give comprehensive coverage at an introductory level to Matrices, Determinants, Trigonometry, Vector Algebra, Statistical Measures and Probability.

Course Objectives

The objective of this course is to enable the students to

- Acquire the knowledge of Matrices, Determinants, Trigonometry, Vector Algebra, Statistical Measures and Probability concepts to implement them in their core domain.
- Appreciate the importance of Matrices, Determinants, Trigonometry, Vector Algebra, Statistical Measures and Probability in their core domain.

Course Outcomes

After successful completion of this course, the students should be able to

	Define and explain the fundamental concepts of Matrices, Determinants, Trigonometry, Vector Algebra, Statistical Measures and Probability	
CO1	Apply the concepts of Matrices, Determinants, Trigonometry, Vector Algebra, Statistical Measures and Probability in solving problems.	PO1
CO2	Identify and Apply the mathematical concepts in their core domain	PO2
CO3	Work as a member of a team to demonstrate the understanding of Matrices, Determinants, Trigonometry, Vector Algebra, Statistical Measures and Probability through engineering tool	PO4, PO6, PO7
CO4	Make a oral presentation of life of the importance of mathematics for engineering.	PO5, PO6

Pre-requisites

High School Mathematics

BEH102	Engineering Mathematics	L	T	P	C
Theory		3	1	0	4

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2		2					
CO3				2		1	1
CO4					2	1	

Legend:3 -High Correlation, 2-Medium Correlation,1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real- world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

BEH102	Engineering Mathematics	L	T	P	C
Theory		3	1	0	4

Assessment Methodology

	Continuous Assessment Test (40marks)			
	CAT 1	CAT 2	CAT 3 (Model)	End Semester Examination (60 marks)
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

BEH102	Engineering Mathematics	L	T	P	C
Theory		3	1	0	4

Unit I	MATRICES AND DETERMINANTS	
1.1 Matrices – Types of matrices – Equality, addition, subtraction, scalar multiplication and multiplication of matrices–Transpose of a matrix – Determinants – Values of second and third order determinants. **1.2** Solution of simultaneous linear equations using Cramer's rule for 2 and 3 unknowns. **1.3** Singular and non-singular matrices – Minor and cofactor – Cofactor matrix – Adjoint matrix – Inverse of a matrix – Simple problems – Engineering applications (not for examinations).		9+3
Unit II	TRIGONOMETRY	
2.1 Degree and Radian – Relation between degree and radian – Trigonometric ratios – Trigonometric ratios of standard angles–Graphs of $\sin x$, $\cos x$, $\tan x$ and e^x **2.2** Compound angle identities – $\sin(A \pm B)$, $\cos(A \pm B)$ and $\tan(A \pm B)$ (without proof)- Simple problems **2.3** Double angle identities – $\sin 2A$, $\cos 2A$ and $\tan 2A$ (without proof) –Simple problems–Engineering applications (not for examinations).		9+3
Unit III	VECTOR ALGEBRA	
3.1 Definition, notation and rectangular resolution of a vector – Position vector-Addition and subtraction of vectors – Magnitude of a vector – Unit vector – Direction ratios –Direction cosines. **3.2** Scalar product and vector product of two vectors – Projection – Angle between two vectors – Unit vector perpendicular to two vectors. **3.3** Area of triangles and parallelograms using vector product –Simple problems – Engineering applications (not for examinations).		9+3
Unit IV	STATISTICS	
4.1 Statistical data – Ungrouped data – Grouped data – Discrete data – Continuous data – Measures of Central Tendency Arithmetic Mean – Median - Mode **4.2** Variance – Standard deviation **4.3** Fitting a straight line using the method of least squares – Simple problems – Engineering applications(not for examinations).		9+3
Unit V	PROBABILITY	
5.1 Random experiment – Outcomes – Sample space – Events –Occurrence of events – 'not', 'and' and 'or' events – Exhaustive events – Mutually exclusive events– Classical definition of probability – Axioms of probability. **5.2** Probability of an event – Probability of 'not', 'and' and 'or' events. **5.3** Conditional probability – Multiplication rule – Independent events – Simple problems (Combinatorial Problems excluded) – Engineering applications (not for examinations).		9+3
TOTAL HOURS		**60**

BEH102	**Engineering Mathematics**	L	T	P	C
Theory		3	1	0	4

References

- Higher Secondary First Year Mathematics Volume-I & Volume-II, Tamil Nadu Textbook and Educational Services Corporation, Government of Tamil Nadu, 2022.
- Higher Secondary Second Year Mathematics Volume-I & Volume-II, Tamil Nadu Textbook and Educational Services Corporation, Government of Tamil Nadu, 2022.
- John Bird, Higher Engineering Mathematics, Routledge, 9thEdition, 2021.
- Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
- Deepak Singh, Mathematics-I, Khanna Book Publishing Co.(P) Ltd., 2021.
- Garima Singh, Mathematics-II, Khanna Book Publishing Co.(P)Ltd.,2021.

Web-based/Online Resources

https://www.khanacademy.org/math/

https://www.mathportal.org/

https://openstax.org/subjects/math

https://www.mathhelp.com/

https://www.geogebra.org/

https://www.desmos.com/

https://phet.colorado.edu/

https://swayamprabha.gov.in/ (swayam prabha DTH channel)

BEH102	**Engineering Mathematics**	L	T	P	C
Theory		3	1	0	4

Suggested List of Students Activities

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Find the area of scalene-triangle shaped objects: Choose a scalene-triangle shaped plane object. Make a grid to cover the entire object by drawing one-unit equally spaced horizontal and vertical lines. Choose x-axis and y-axis on the grid and determine the coordinates of the vertices of the triangle. Let $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$, be the vertices. Calculate the area of the object using the formula

$$\frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

- Find the height of a building: Choose a building in the college campus. Mark a point on the ground and measure the shortest distance from the point to the building. Let the distance be d metres. Measure the angle of elevation of the top of the building just above the foot of the perpendicular drawn from the point to the building using a clinometer. Let the angle of elevation be θ. Calculate the height of the building using the formula $h = d \tan \theta$. Compare the result with original height of the building. Use the same technique to calculate the size of the moon or distance of the moon (necessary inputs to be given).

- Predict the amount of electrical power a solar panel can produce: Using appropriate surveying apparatus, find the position-vector representation of the four corners of a solar panel fixed on a roof-top. Let the vectors arranged in counter clock wise direction be $\overrightarrow{OP_1} = x_1\vec{i} + y_1\vec{j} + z_1\vec{k}$, $\overrightarrow{OP_2} = x_2\vec{i} + y_2\vec{j} + z_2\vec{k}$, $\overrightarrow{OP_3} = x_3\vec{i} + y_3\vec{j} + z_3\vec{k}$, $\overrightarrow{OP_4} = x_4\vec{i} + y_4\vec{j} + z_4\vec{k}$. Find the normal vector $\vec{N}$ to the surface $P_1P_2P_3P_4$ using the vector product formula $\vec{N} = \overrightarrow{P_1P_2} \times \overrightarrow{P_1P_4}$. Measure the direction of the sun and determine the unit vector representation of the direction of the sun as $\hat{a} = a_1\vec{i} \rightarrow +a_2\vec{j} \rightarrow +a_3\vec{k}$. Let the intensity of the sunlight be $I\ Watts/m^2$. Give a vector representation to it by $\vec{F}=I\hat{a}$. The scalar product $\vec{F}.\vec{N}$ estimates the amount of energy absorbed and converted on the solar panel. Verify the results with actual electrical power generated by the solar panel.

- Why solar panels are usually tilted? Use the knowledge of trigonometry and vectors to reason and understand whether solar panels should be tilted or not.

- Fit a straight line for height-weight chart: Suppose there are 60 students in the class. Choose 5 students randomly to form group B and form group A with the remaining 55 students. Measure the height and weight of ith student in group A

and denote them as x_i and y_i respectively. Create a bivariate data table consisting heights and weights of all the students in group A as follows.

Height X(in cm)	x_1	x_2	x_3	x_4	...	x_{54}	x_{55}
Weight Y(in kg)	y_1	y_2	y_3	y_4	...	y_{54}	y_{55}

Fit a straight line of the form $y = mx + c$ using the method of least squares by taking height as independent variable and weight as dependent variable. Calculate the weights of the students in group B by inserting the heights in the formula $y=mx+c$ and compare them with their original weights.

- Monty Hall problem: For creating thought-provoking excitement in probability, students can be engaged in the famous Monty Hall problem. The problem is named after Monty Hall, a television game show host. A room is equipped with three doors. There is a car behind one of the doors, but there are goats behind the other two doors. The contestant can choose one door. The host will open one of the other two doors to reveal a goat. Then, the host will give two choices to the contestant. The contestant can stick to the original choice or switch to the other unopened door. If the contestant sticks to the original choice, the probability of winning the car is 1/3. If the contestant switches the selection to the other door, the probability of winning the car is 2/3.

BEH103	**Engineering Physics**	L	T	P	C
Practicum		2	0	2	3

Introduction

   Any technological innovation happens through a firm understanding of basic science. Knowing and developing proper understanding of the scientific principles behind every technological gadget or instrument is inevitable to a polytechnic student. This course systematically introduces the laws of physics which gives correct perspectives of dealing with technology and its societal uses.

Course Objectives

The objective of this course is to enable the student to

1. Understand the concept of units, dimensions and error analysis
2. Outline the geometry of vectors, forces and its vector properties
3. Explain real life application of Newton's law and periodic motion
4. Describe the elastic properties of any solid material with application
5. Explain the heat, work, modes of heat transfer, laws of thermodynamics and observe the heat expansion in materials.

Course Outcomes
On successful completion of this course, the student will

CO1	Expertise in computing the units for any physical quantity and solve problems involving multiple forces applying Triangle and Parallelogram law of forces.	PO1
CO2	Analyse real-world scenarios involving circular motion by identifying the forces acting on objects in circular paths.	PO2
CO3	Design and conduct experiments to determine the Young's modulus of beams of different dimensions.	PO3
CO4	Develop the ability to correctly read and interpret measurements from both screw gauge and vernier caliper including the ability to identify and minimize errors.	PO4
CO5	Understand the environmental impacts of thermodynamic processes and understand the importance of sustainable energy including the role of thermodynamics in renewable energy technologies.	PO5,PO7

Pre-requisites

High School Science

BEH103	Engineering Physics	L	T	P	C
Practicum		2	0	2	3

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2		3					
CO3			3				
CO4				3			
CO5					3		1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.

- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real- world engineering and technological applications. Try to give source examples from where the students would be familiar - like sports, or an activity that they usually engage in frequently.

- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.

- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-and employability-based.

- All demonstrations/Hand-on practices are under a simulated environment (maybe followed by a real environment as far as possible).

- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where could be the source of error, if any.

BEH 103	**Engineering Physics**	**L**	**T**	**P**	**C**
Practicum		**2**	**0**	**2**	**3**

Assessment Methodology

	Continuous Assessment Test (40marks)			End Semester Examination (60 marks)
	CAT 1	CAT 2	CAT 3	
Mode	Written Test (Theory)	Written Test (Theory)	Lab Assessment	Written Examination (Theory)
Duration	2hours		2 hours	2 ½ hours
Exam Marks	30	30	60	60
Converted to	15	15	10	60
Marks	40			60

BEH103	Engineering Physics	L	T	P	C
Practicum		2	0	2	3

Unit I	UNITS AND MEASUREMENTS	
Introduction – Science & Technology – Units and dimensions – definition – fundamental quantities – definition and their SI units, symbols – Derived physical quantities – Dimensional formula for length, mass and time, SI unit multiples and submultiples and prefixes of units. Conventions to be followed in SI units. Measurements: Need & limitations of measuring instruments, least count, types of measurement, – screw gauge – Vernier caliper - Applications into industries. Errors in measurement (systematic and random), Definition – absolute error, relative error (no derivation) – precautions to avoid systematic and random errors – Engineering applications. Physical quantities: velocity, momentum, acceleration, force, impulse, work, energy and power, Horse power, watt, Calorie and Joule – Conversions.		6
Ex. 1 SCREW GAUGE: Using Screw Gauge: (i) Find the volume of the glass plate by measuring its thickness and area (ii) List the different ranges of screw gauge and applications used in the industries.		4
Ex. 2 VERNIER CALIPER: Using Vernier Caliper: (i) Find the volume of a given solid cylinder by measuring its length and diameter (ii) Find the volume of a given hollow cylinder by measuring its length and inner and outer diameter.		4
Unit II	STATICS	
Scalar and vector quantities: Definition and examples – Resolution of vector into two perpendicular components – Concurrent forces & coplanar forces: Examples – Resultant and Equilibrant force – Triangle and Parallelogram law for two forces: Statement only (no derivation), Examples – Lami's theorem – statement and explanation–Experimental verification of parallelogram of forces and Lami's theorem–Engineering applications - Moment of force, Couple – Principle of moments – Determination of mass of the given body.		6
Ex.3 VERIFICATION OF LAMI'S THEOREM: Verification of parallelogram and Lami's theorem for concurrent forces		4
Ex.4 PRINCIPLE OF MOMENT: Using the principle of moment, determine the unknown mass of the given object		2
Unit III	DYNAMICS	
Newton laws, kinematic equations – Examples (horizontal, freely falling, vertically thrown) – Projectile motion (qualitative discussion) – Circular motion – angular velocity – period – frequency – relation between linear and angular velocity – centripetal and centrifugal force: application of centripetal and centrifugal forces (working of a centrifuge device) - Simple harmonic motion – amplitude – frequency – period – Simple pendulum – Acceleration due to gravity		6

BEH103	Engineering Physics	L	T	P	C
Practicum		2	0	2	3
Ex.5 SIMPLE PENDULUM: Determination of acceleration due to gravity using simple pendulum					4
Unit IV	ELASTIC PROPERTIES OF SOLIDS				
Elastic and plastic bodies – stress-strain – definitions – Hooke's Law – three types of strain – stress-strain curve – elastic and plastic limit – Three modulus of elasticity and its relations (no derivation) – Uniform and non-uniform bending of beams – Experimental determination of Young's modulus by uniform bending – Poisson ratio –Engineering applications of elasticity – I-shaped girders.					6
Ex. 6 YOUNG'S MODULUS: Determination of young's modulus of a given object (one-meter wood scale) using mirror (optic lever) and telescope method.					4
Ex. 7 HELICAL SPRING: Verification of Hooke's law and determination of Spring constant of helical spring					4
Unit V	HEAT				
Concept of heat – temperature – centigrade, Fahrenheit and Kelvin scales – conduction, convection –radiation – Good and bad thermal conductors – Properties of thermal radiation – Heat conversion – Specific heat capacity – Laws of thermodynamics – different types of process – Examples – Ideal gas – Boyle's Law.					6
Ex.8 BIMETALLIC STRIP: To observe and explain the effect of heating on a bimetallic strip					4
TOTAL HOURS					**60**

Suggested List of Students Activity (Ungraded)

- Presentation/Seminars by students on any recent technological developments based on fundamental physics
- Periodic class quizzes conducted on a weekly/fortnightly basis to reinforce the basic physics concepts
- Micro project that shall be an extension of any practical lab exercise to real-world application
- Connecting sports to physics concepts:
  - Basketball or football with vectors - projectile motion (horizontal and vertical component). Intuitive understanding of the vectors. Students try out different angles of shooting the ball. For example, asking students through different combinations what angle of throw gives the farthest range, then later compare their answer with a mathematical equation.
- Factors affecting pendulum parameters - does length or mass affect the time period of the pendulum? Does the value of g depend on the setup of the pendulum?
- For STATICS unit-understanding forces involved in the game of human pyramid- can do a demonstration or an activity where cards or paper cups can be used for constructing a pyramid and understand how each cup is in equilibrium despite many forces acting on them.

Text Book

- Basic Physics, Published by Directorate of Technical Education, Government of Tamil Nadu.

Reference

- Conceptual Physics - Paul G. Hewitt 13e edition – Pearson publication
- Fundamentals of Physics, David Halliday, Jearl Walker, Wiley Publication
- H.C.Verma, Concepts of Physics Vol 1 & Vol 2, Bharathi Bhavan Publishers, 1st edition, 2021.

Web-based/Online Resources

https://www.youtube.com/@Ch22PhysicsIITPAL

https://www.youtube.com/playlist?list=PLyQSN7X0ro203puVhQsmCj9qhlFQ-As8ehttps://youtube.com/playlist?list=PLFE3074A4CB751B2

https://www.youtube.com/watch?v=OKC_g3obGTo

https://www.youtube.com/watch?v=x1ef048b3CE

https://www.youtube.com/watch?v=nQXodRH7F4c

https://www.youtube.com/watch?v=egURSFBCaOU

BEH104	**Engineering Chemistry**	L	T	P	C
Practicum		2	0	2	3

Introduction

Engineering is the application of the principles of basic science. The present syllabi of Basic Chemistry compiled for Diploma Engineering students restricts itself to certain limits, where it concentrates on basic concepts and useful applications viz. solution chemistry, surface chemistry, engineering polymeric materials like plastics, rubbers and electrochemistry, types of battery, preventions of corrosion. Enriching social awareness is an important component of education, hence, environmental chemistry aspects like air pollution, solid waste management and green chemistry are also included.

Course Objectives

The objective of this course is to enable the student to

1. Outline the importance of acids, base pH Indicators with industrial applications.
2. Illustrate the adsorption properties of colloidal particles, catalyst and their application.
3. Examine the engineering polymeric materials like rubber & plastics.
4. Explain about electro chemistry, electro chemical cells, batteries and to know about corrosion and prevention.
5. Appreciate the importance of Environmental Chemistry.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Enumerate the concentration, strength & pH of acids & base.

CO2: Demonstrate the catalytic & colloidal principles & properties.

CO3: Elucidate the composite & usage of plastics and polymer products.

CO4: Articulate the principles in electroplating, batteries and corrosion.

CO5: Interpret the effect of environmental hazards and the need of Green Chemistry.

Pre-requisites

High School Science

BEH104	Engineering Chemistry	L	T	P	C
Practicum		2	0	2	3

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2		2	1	1
CO2	3	3	2		2	1	1
CO3	3	3	2		2	1	1
CO4	3	3	3		2	1	1
CO5	3	3	3		2	1	1

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real- world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientificmindset.Studentactivitiesshouldbeplannedonallthetopics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-and employability-based.
- All demonstrations/Hand-on practices are under as imulated environment (may be followed by a real environment as far as possible).

BEH104	Engineering Chemistry	L	T	P	C
Practicum		2	0	2	3

Assessment Methodology

	Continuous Assessment Test (40marks)			End Semester Examination (60 marks)
	CAT 1	CAT 2	CAT 3	
Mode	Written Test (Theory)	Written Test (Theory)	Lab Assessment	Written Examination (Theory)
Duration	2hours		2 hours	2 ½ hours
Exam Marks	30	30	60	60
Converted to	15	15	10	60
Marks	40			60

BEH104	Engineering Chemistry	L	T	P	C
Practicum		2	0	2	3

Unit I	SOLUTION CHEMISTRY	
Solution –Solute, Solvent - dilute and concentrated solution – methods of expressing the concentration of the solution – molality – molarity – normality (simple numerical problems only). Properties of acids and bases-Lewis concept of acids and bases–advantages-pH and pOH–Definition–Indicator– Definition– Buffer solution–Definition–Types of buffer solution with examples– Application of Ph in industries.	6
Ex1.Estimation of sulphuric acid Ex2.Estimation of strong acid by pH metry	6
Unit II	**SURFACE CHEMISTRY**	
Colloids – Definition – True solution and Colloidal solution – Differences – lyophilic colloids and lyophobic colloids (definitions only)– Properties - Tyndall effect – Brownian movement – Industrial applications of colloids. Smoke Precipitation by Cottrell's method, Purification of water, Catalyst – Definition– Positive – Negative catalyst–Definition–Types of catalysis–Homogeneous and Heterogeneous catalysis examples – Characteristics of a catalyst–Industrial Applications of catalysts.	6
Ex3.Preparation of lyophilic colloids and lyophobic colloids	6
Unit III	**POLYMER CHEMSITRY**	
Plastics – types – Types of Polymerization-Addition and condensation polymerization Thermoplastics and Thermo set plastics – Differences – Mechanical properties of plastics–Advantages of plastics over traditional materials-Natural polymer–Rubber–Extraction of rubber from latex-defects of natural rubber–Vulcanization–Compounding of rubber–Ingredients and their functions.	6
Ex4.Preparation of thermo setting resin-Urea-form alde hyderesins	6
Unit IV	**ELECTRO CHEMISTRY**	
Electronic concept of oxidation and reduction– electrolytes -classification-strong, weak and non-electrolyte – examples – electrolysis – definition – Mechanism – Industrial applications of Electrolysis - Chrome plating - Primary Battery – SecondaryBattery–Definition, examples & construction of Li-ion Battery. Corrosion (Definition)–Differential aeration theory only – Factors Influencing Rate of Corrosion.–Methods of Prevention of Corrosion (qualitative).	6
Ex.5.Estimation of Mohr's salt by permanganometry Ex.6.Comparison of strength of two KMnO4 solutions	6

BEH104	Engineering Chemistry	L	T	P	C
Practicum		2	0	2	3

Unit V	ENVIRONMENTAL CHEMISTRY	
Air pollution–Definition–Air pollutants (SO_2, H_2S, HF, CO and Dust)–Sources and Harmful effects – Formation of Acid Rain – Harmful effects – Green House Effect–Causes–Ozone layer depletion and its harmful effects - Global warming – Harmful effects – Control of Air Pollution. Solid Waste – Definition – Problems – Types of Solid waste methods of Disposal – Land fill and Incineration – Recycling – Definition – Examples–Advantages of Recycling (Basic ideas) Green Chemistry Definition–Goals of Green Chemistry.	6
Ex7.Crystallization of copper sulphate and identification of ions Ex8.Decolorization of clayey water usings and bed.	6
TOTAL HOURS	**60**

Suggested List of Students Activity

- Mini Projects like working model of experiments like chrome plating, tinning and sand bed.
- Better understanding through worksheets/Quiz/Oral Testing.
- Crossword puzzles and poster making.

Reference

- Textbook on Chemistry for XI standard (TN State Board).
- Textbook on Chemistry for XII standard(TN State Board).
- Essentials of Physical Chemistry, Bahl &Tuli, 28th edition, S.Chand Publishing House.
- A textbook of Engineering Chemistry, Dr. Sunita Rattan, 2020reprint, S. K. Kataria & Sons.
- Textbook of Physical Chemistry, P. L. Soni, O.P. Dharmarha & U.N.Dash, 2022 edition, S.Chand Publishing House.

Web-based/Online Resources

https://libguides.lib.msu.edu/chemistry/teachonline

https://www.khanacademy.org/science/chemistry

https://phet.colorado.edu/

https://www.sciencebysimulation.com/chemreax/Faq.aspx

BEH171	**Communicative English I**	**L**	**T**	**P**	**C**
Practicum		**1**	**0**	**2**	**2**

Introduction

Language is a means of self-expression and one of the prime tools of communication. Communicative fluency augments one's personal, academic, social and professional life. The present syllabus focuses on four Communication Skills, viz. Listening, Speaking, Reading and Writing and enables the students at the Diploma level to gain confidence and fluency in communication which in turn would enhance them to face their career commitments with globalized standards.

Course Objectives

The objective of this course is to enable the student to

1. Use English confidently for practical purposes across the curriculum.
2. Express ideas in clear and grammatically correct usage.
3. Plan, organize and present ideas coherently using cohesive devices.
4. Analyze, interpret, infer and evaluate ideas and respond appropriately.
5. Enable learners to communicate effectively and appropriately in real-life situations.

Course Outcomes

After successful completion of this course, the students should be able to

CO1	Communicate effectively in English, using appropriate vocabulary.	PO1
CO2	Analyze and evaluate any given information with logically supported ideas.	PO2
CO3	Frame grammatically correct sentences with clarity.	PO3, PO4
CO4	Present ideas confidently and coherently using cohesive devices.	PO6
CO5	Practice and apply Listening, Speaking, Reading and Writing skills beyond the	PO7

BEH171	Communicative English I	L	T	P	C
Practicum		1	0	2	2

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2		2					
CO3			3	2			
CO4						3	
CO5							3

Legend:3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

The instructional strategy for Communicative English classes employs a learner-centered and communicative approach that focuses on active student participation and engagement. Here are some key strategies to be followed:

- Communicative Activities: Design and facilitate activities that encourage students to actively use the language in meaningful and authentic contexts. This can include role plays, language games, discussions, debates, group projects, and problem- solving tasks.
- Pair and Group Work: Incorporate pair and group work opportunities to promote student interaction and collaboration. This allows them to practice and reinforce their language skills through communication with their peers.
- Authentic Materials: Utilize authentic materials such as news articles, videos, podcasts, and real-life texts to expose students to genuine language use and cultural contexts. This helps develop their comprehension and critical thinking skills while expanding their vocabulary and cultural awareness.
- Task-Based Learning: Implement task-based learning activities where students work on specific tasks or projects that require them to use English for a real-world purpose.
- Language Input and Output Balance: Ensure a balance between language input (exposure to new vocabulary, grammar structures, and examples) and language output (opportunities for students to produce language). This balance allows students to build both receptive (Listening & Reading)and productive language skills (Speaking & Writing)

BEH171	Communicative English I	L	T	P	C
Practicum		1	0	2	2

- Use of Technology: Incorporate technology tools and resources, such as language learning apps, online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional language practice opportunities.
- Multimodal Approaches: Engage students through a variety of modalities, including listening, speaking, reading, and writing, as well as incorporating visual aids, gestures, and real-life examples. This caters to different learning styles and reinforces language learning through multiple channels.
- Regular Assessment and Reflection: Incorporate formative and summative assessments to gauge student progress and provide targeted feedback. Encourage students to reflect on their language learning journey, set goals, and actively monitor their own progress.

Assessment Methodology

	Continuous Assessment (40marks)				End Semester Examination (60 Marks)
	CA1	CA2	CA3	CA4	
Mode	Lab Assessment	Lab Assessment	Model Exam	Record	Practicum Exam
Duration	2 Hours		2½ hours	-	2 hours 30 Minutes
Exam Marks	40 (Theory-20+ Practical-20)	40 (Theory-20+ Practical-20)	60 (Theory-30+ Practical-30)	20	30 (Theory-30+ Practical-30)
Converted to	10	10	10	-	60
Marks	10 (Best of CA1 & CA2)		10	20	60

BEH171	Communicative English I	L	T	P	C
Practicum		**1**	**0**	**2**	**2**

Unit I	EXPRESSIVE ENGLISH	
THEORY: 'Night of the Scorpion' by Nissim Ezekiel FOCUS ON: Differentiating Open Class Words - (Noun, Verb, Adjective, Adverb) (Based on the poem)	3
PRACTICAL:(Lab/Activity) LISTENING: Simple and short poems on NATURE (Selected poems will be given) Identification: Nouns, Adjectives, Rhyming Words Ex.1Listening to poems on NATURE and Identifying Nouns, Adjectives and Rhyming Words A Short poem on Nature of 8 – 10 to be given. Students will be asked to listen to the audio played / poem read and identifies the nouns, adjectives and rhyming words used in the poem. Listening practice is to be given. (To Be Recorded in the Record Note Book) SPEAKING: Word Game (Essential words to be given) (Nouns, Verbs, Adjectives, Adverbs) Oral practice is to be given. READING: Tongue Twisters (Selected 20 sentences will be given) Oral practice is to be given. WRITING: Academic Letters (Model Letters to be given) Written practice is to be given.	6

Unit II	CREATIVE ENGLISH	
THEORY: 'River' by A.K.Ramanujam FOCUS ON: Usage of Main Verb/Auxiliary Verb/Modal Verb and Tenses	3
PRACTICAL:(Lab/Activity) LISTENING: General simple/short poems on MOTIVATION / SOFT SKILLS (Selected poems will be given). Fill ups: a) Information Gaps, b) Main Verbs/Modal Verbs. Listening practice is to be given. SPEAKING: Useful Expressions (Greetings, Requesting. Asking / Eliciting information, Offering Suggestions / Opinions) Ex. 2 Speaking-Useful Expressions- Students will be asked to give suitable expressions according to the context given. Speaking practice is given (To Be Recorded in the Record Note Book) READING: Comic Strips, Small Conversations. Oral practice is to be given. WRITING: Sentence Making using Substitution Table (Based on Tenses) Writing practice is given.	6

BEH171	Communicative English I	L	T	P	C
Practicum		1	0	2	2

Unit III	**EFFECTIVE ENGLISH**	

THEORY: PROSE COMBINED WITH LSRW SKILLS FOCUS ON: Linkers & Connectives	3
PRACTICAL: (Lab/Activity) LISTENING: Short Story on Moral Value (Identifying Linkers). Listening practice is to be given. SPEAKING: Just a Minute Talk (JAM) (Selected Topics can be given). Speaking practice is to be given READING: General Paragraph on Moral Values (Selected passages is to be given) Ex. 3 Reading General Paragraph on Moral Values. Students will be asked to read the given passage on Moral Values with proper Stress and Intonation. Reading practice is to be given. (To Be Recorded in the Record Note Book) WRITING: Note Taking/Summarization (Based on the General Paragraph given). Written practice is to be given.	6

Unit IV	**SITUATIONAL ENGLISH**	

THEORY: PROSE COMBINED WITH LSRW SKILLS Networking Skills FOCUS ON: Spotting the Errors in the given sentences	3
PRACTICAL: (Lab/Activity) LISTENING: General Conversations. Framing Sentences (Based on the words used in the conversation). Listening practice is to be given. SPEAKING: Introducing Oneself/Others. Ex. 4 Speaking - Introducing Oneself / Others. Students will be asked to Introduce himself/herself and their family members/friends. Speaking practice is to be given. (To Be Recorded in the Record Note Book) READING: Reading General Paragraphs and identifying main points (Skimming). Reading practice is to be given. WRITING: General Paragraph Writing (5lines)(Hints to be given).Writing practice is to be given.	6

Unit V	**FUNCTIONAL ENGLISH**	

THEORY:PROSE COMBINED WITH LSRW SKILLS Passage on Generative AI FOCUS ON: Passive Voice	3

PRACTICAL:(Lab/Activity) LISTENING: General passages related to technology (Comprehension Questions). Listening practice is to be given. SPEAKING: Product description (Model exercises based on their respective branches to be given). Speaking practice is to be given. READING: Reading technical passages and identifying specific points (Scanning) (Model passages for reading are given). Reading practice is to be given. WRITING: Paragraph Writing(6-8lines)Writing with a suitable Topic Sentence, Explanatory Sentences, Examples and using Link words (TEEL Model) Ex. 5 Writing paragraph using TEEL model. Students will be asked to write a paragraph using the TEEL model of giving the Topic Sentence, Explanatory Sentences, Examples and using Link words. Writing practice is to be given. (To Be Recorded in the Record Note Book)	6
TOTAL HOURS	**45**

Suggested List of Students Activity

- Role Plays: Assign students different roles or scenarios and have them engage in conversations or situations to practice speaking and listening skills.
- Information Gap Activities: Create activities where students need to exchange information with each other to complete a task or solve a problem. This encourages communication and collaboration.
- Descriptive Presentations: Ask students to give presentations about a specific topic, describing it in detail and using appropriate vocabulary and language structures.
- Language Games: Incorporate language learning games like word puzzles, vocabulary quizzes, charades, or language board games to make learning enjoyable and interactive.
- Problem-Solving Tasks: Provide real-life or hypothetical problems that students must solve through discussion and collaboration. This encourages critical thinking and effective communication.
- News Discussions: Bring in current news articles or videos for students to discuss and express their opinions on various topics.
- Collaborative Writing: Assign group writing tasks where students collaborate to create a story, report, or presentation. This promotes teamwork and helps improve writing skills.
- Simulations: Create simulated scenarios or real-life situations where students must use English to navigate and interact, such as ordering food in a restaurant or booking a hotel room.

Text Books

- "Cambridge English Skills: Real Listening and Speaking" by Miles Craven
- "Writing Better English for ESL Learners" by Ed Swick
- "English Grammar in Use" by Ray Murphy

Reference

- English Grammar And Composition   by Wren & Martin
- "Practical English Usage" by Michael Swan
- "Oxford Basics –Simple Reading Activities" by Jill Hadfield, Charles Hadfield
- "Oxford Basics– Simple Speaking Activities" by Jill Hadfield, Charles Hadfield

Web-based/Online Resources

https://www.bbc.co.uk/learningenglish/

https://www.fluentu.com/

https://www.englishclub.com/

BEH 172	**Basic Workshop Practices**	L	T	P	C
Practicum		1	0	2	2

Introduction

Basic Workshop Practices help to develop the technical hands-on skills required by the technicians working in various Engineering sectors. This course intends to impart the basics of hand tools and their uses in different sections of manufacturing. The topics covered are based on the syllabus for diploma studies in Engineering. The course is planned to include basic practical experience in Fitting, Wiring and Plumbing. The courses are arranged in sequence, that starts from the basic concepts on safety rules followed in Industries, Dimensioning system, Basic Measuring instruments & basic tools used for Manufacturing processes. In this course, it is expected that the students would be able to get workshop experience, which helps to build an understanding of the complexity of the industrial job and the skills requirement of the jobs.

Course Objectives

The objective of this course is to enable the student to

1. Understand the importance of safety & Precautions in Industries.
2. Understand and practice the 5Ssystem in Industries.
3. Identify suitable marking and measuring tools for materials.
4. Read the drawing and understand the dimensioning system.
5. Practical skills on Fitting, Plumbing & Wiring trades.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Illustrate the safety aspects and 5ssystem in Industry.

CO2: Identify & select the appropriate tools required for specific operations.

CO3: Prepare the jobs according to the drawing for Fitting, Plumbing and Wiring.

CO4: Produce jobs as per specified dimensions and inspect the job for quality

CO5: Demonstrate the Fitting, Wiring and plumbing practices for house wiring practice, install and test a battery with hydrometer.

Pre- requisites

Nil

BEH 172	Basic Workshop Practices	L	T	P	C
Practicum		1	0	2	2

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	3	2		1
CO2	3	1		3			2
CO3	3	3		3	1		1
CO4	3	2	1	3	1		2
CO5	3	1	1	2	1		3

Legend:3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

BEH 172	**Basic Workshop Practices**	L	T	P	C
Practicum		**1**	**0**	**2**	**2**

Assessment Methodology

	Continuous Assessment (40marks)				End Semester Examination (60marks)
	CAT 1	**CAT 2**	**CAT 3**	**CAT 4**	
Mode	Lab Assessment (Ex.1,2,4,7 & 8)	Lab Assessment (Ex.3,5,6,9 & 10)	Model Exam (Ex1 to10)	Class Assessment	Practical Examination
Duration	2hours		3hours	During Practice Hours, every exercise should be evaluated to 10 marks	3hours
Exam Marks	80	80	100	100	100
Converted to	10	10	10	10	60
Marks	20		20		60

BEH 172	Basic Workshop Practices	L	T	P	C
Practicum		1	0	2	2

THEORY	
Unit I	**SAFETY**
Introduction to safety – safety slogans – personal safety – personal protective Equipment - safety signs – caution sign, fire safety sign – sign posters – Industrialsafety–machinesafetyrules–safetyworkingpractices,precautiontobe taken to prevent electric shock-5S Principle – Sort, Set in order, Shine, Standardize and Sustain	3
Unit II	**DIMENSIONING SYSTEM**
Limits-fits–tolerances–Allowances-typesoffits–holebasissystem-shaftbasissystem– simpleexamples–difference–geometricdimensioning–flatness, straightness, circularity, concentricity, run out, parallelism, perpendicularity, Angularity, cylindricity	3
Unit III	**BASIC MEASURING INSTRUMENTS**
Basic instruments–steel rule, divider, calliper, try square, measuring tape, vernier calliper, micrometer-inside micrometer, outside micrometer-protractor-height gauge - dialgauge- V block, surface plate radius gauge, sine bar, slip gauge set, feeler gauge, wire gauge, Voltmeter, Ammeter, Multi meter.	3
Unit IV	**BASIC TOOLS**
Fitting : Work holding devices – bench vice, machine vice, fixture - tool holding devices–hack saw frame, drill chuck, sleeve–fitting tools–files-types–punches-center, dot punches – hammer – types - claw hammer- scribers – chisel - drill bit –straight shank- Tapper shank-handreamer-handtaps.Screwdriver–types,uses-cuttingpliers-types, uses, hand drilling machine. Wiring : Types of electrical wiring system – Single phase wiring - Three phase wiring–differences & applications Plumbing: Pipe vice, wrenches -types-pipe wrench, adjustable wrench, chain wrench, pipe cutter, Solution to join pipes, thread sealing tape for pipe fitting-Screws -types.	3
Unit V	**BASIC PRACTICES**
Fitting-Tools-Cutting practice–Filing practice. Wiring–Tools-wiring symbols-Circuit–Connection practice. Plumbing–Tools–type of joints-Joint practice.	3

Note:1 Mark questions should be prepared unit wise (I to IV) as a question bank, the same can be used for the end semester examinations for 20marks

BEH 172	Basic Workshop Practices	L	T	P	C
Practicum		1	0	2	2

PRACTICAL		
Ex.No	Name of the Exercise	Hours
1	Fitting-Cutting & Filing of a profile	2
2	Fitting-Drilling, Countersinking ,Counter boring, Tapping	2
3	Fitting-L-Mating	2
4	Wiring–Draw the circuit diagram and connect for the connection of Two lamp, two switch with socket– parallel and series connection.	2
5	Wiring-Draw the circuit diagram and connect the connection for Fan-switch-regulator, and Fluorescent lamp controlled by switch.	2
6	Wiring-Draw the circuit diagram and connect for the Stair case wiring	2
7	Installation of a battery, Charging and testing a Battery with hydrometer	2
8	Plumbing–Cutting and External Threading of GI pipes using Die set	2
9	Plumbing–Connect the pipe line for the Sink/washbasin with tap	2
10	Plumbing-Connect the pipe line for the connection for Rainwater Harvesting	2
Practice + Continuous Test + Revision		10
TOTAL HOURS		**30**

Suggested list of students activity

Prepare/Download a specification of the following:

- Various tools & Equipment in various shops.
- Precision equipment in the workshop.
- Various machinery in the workshop.
- Visitany fabrication/ woodworking workshop and prepare a report.
- Prepare 5S chart for each machine in your workshop and maintain this report during your Lab hours.

Text Books

- A Textbook of Manufacturing Process, Gupta, J.K.,Khurmi, R.S.S.Chand and Co. New Delhi ISBN:81-219-3092-8 (WorkshopTech.) Publication.
- A Text Book of Electrical Technology B.L.Theraja, A.K.Theraja–S.Chand & Company Ltd.

Reference Books

- Basic Manufacturing "Roger Timings" Third Edition–Newness, An imprint of Elsevier.
- Industrial Organisation and Engineering Economics–"T.R.Banga, S.C.Sharma"-Khanna Publishers
- Industrial Engineering and Management"O.P.Khana"–Dhanbat Rai Publications.
- Machine Drawing-K.L.Narayana, P.kannaiah, K.Venkatareddy–New Age International Publishers.
- Workshop practices, HS Bawa,Tata McGraw-Hill,2009
- Elements of workshop Technology, Hajra Choudhury S. K., Hajra Choudry A.K. and NirjharJoy.
- Workshop Technology by Chapman W.A.J and Arnold E.

Web-based/Online Resources

https://onlinecourses.nptel.ac.in

Additional Instructions

- For the record of work done notebook or manual may be used. In this, the student should draw a diagram, and mention the readings/observations, calculations and result manually. The same has to be submitted for the end-semester examination on the first attempt.
- The proper safety procedure and norms should be followed with proper uniform (Khaki pants & half-hand shirt) with safety shoes during the practices.
- All the Exercise should be completed, One Exercise should be given by lot or question paper received from DOTE should be followed for the end semester Examination.

Allocation of Marks

Part	Description	Marks
Fitting/Wiring/Plumbing		
A	Marking/Circuit diagram	20
B	List of tools	5
C	Cutting and Filing/ Circuit /Pipe Connection	20
D	Dimension/Verification of Connection	5
E	Written Test (Theory Portion)	10
TOTAL MARKS		**60**

Note: One Mark questions shall be given from the Theory Portions. 20 X1 = 20Marks

BEH 173	**Digital Workplace Skills**	L	T	P	C
Practical		0	0	4	2

Introduction

Being able to embrace new technology in the workplace helps to streamline working processes. Digital workplace skills provide knowledge for sharing and collaboration in many new and effective ways. It is used in a connected digital environment providing access to share, present, and report information effectively and efficiently to increase productivity in a safe & secure environment.

Course Objectives

The objective of this course is to enable the student to

1. Introduce the basics of computer hardware, operating systems, and Internet usage.
2. Explore various office productivity tools and text processing.
3. Apply various information analysis tools with the help of spreadsheets.
4. Understand the effective presentation of information.
5. Identify the communication and security tools for information protection.

Course Outcomes

After successful completion of this course, the students should be able to

CO1:   Demonstrate the ability to use various operating systems and internet utilities.

CO2: Experiment various office productivity tools.

CO3:   Analyze the information gathered with the help of spreadsheet.

CO4: Explore the various communication tools available.

CO5:   Identify the appropriate tools for securing the information.

Pre-requisites:

Nil

BEH 173	Digital Workplace Skills	L	T	P	C
Practical		0	0	4	2

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3			3	1
CO2	3	3	3			3	2
CO3	3	3	3			3	1
CO4	3	3	3			3	2
CO5	3	3	3			3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Assessment Methodology

	Continuous Assessment (40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practical Test (Ex. 1 to 5)	Practical Test (Ex. 6 to 10)	Practical Record Submission	Practical Examination
Duration	2 hours		--	2 hours 30 Minutes
Exam Marks	40	40	20	60
Converted to	10	10	20	-
Marks	40			60

BEH 173	Digital Workplace Skills	L	T	P	C
Practical		0	0	4	2

Unit I	INTRODUCTION TO DIGITAL WORKPLACE	
Basics of computer - understanding of various computer hardware components (CPU, Memory unit, Display, keyboard, mouse, hard disk and other peripheral devices) and operating systems (Windows, Linux)	2
Ex No 1 a) Basic Navigations in Operating Systems - Windows, Ubuntu etc b) Usage of Browsers (Edge, chrome etc) c) Usage of search engines (Google, Bing etc) (Students have to use any one tool in Board Examination for each of above exercise)	4
Unit II	BASIC PRODUCTIVITY TOOLS	
Exploring office tools- word document creation, basic editing, formatting, Tables, Page Break, Equations, Hyperlinks, and Pictures.	2
Ex No 2 Create a document with basic editing, formatting options, Tables, Equations, Hyperlinks, Pictures	4
Ex No 3 Create a standard covering letter and use mail merge to generate customized letters and generate labels by creating a database.	4
Unit III	INFORMATION ANALYSIS	
Sorting, Filtering, and creation of different charts. Print Preview, Printing, Shortcuts and Exercises. –using Excel /Google Sheets.	2
Ex No 4 Spreadsheet creation, data handling, formatting, calculations using formulae and functions using Excel / Google Sheets. (Students have to use any one tool in Board Examination)	4
Ex No 5 Sorting, Filtering, and creation of different charts. Print Preview, Printing-Using Excel / Google Sheets. (Students have to use any one tool in Board Examination)	4
Unit IV	INFORMATION PRESENTATION	
Creation of presentation, formatting, video and sound, slide animation, shortcuts – MS Power point, Google slides. Canva, Figma –designing.	4
Ex No 6 Creation of Presentation, editing, saving, Slide creation, Charts, Tables, Pictures, Smart Art, Slide Number, Header, Footer, Date, Shapes, Video and Sound. Slide Animation, Running a slide show, Print Preview. –PowerPoint, Google slides etc (Students have to use any one tool in Board Examination)	4

BEH 173	Digital Workplace Skills	L	T	P	C
Practical		0	0	4	2
Ex No 7. Designing with Canva, Figma. (Students have to do any one tool in Board Examination)					4
Unit V	**COMMUNICATION TOOLS AND INTRODUCTION TO INFORMATION SECURITY**				
Introduction to email and usage, overview of video and web conferencing tools, texting tools. Productivity tools in the browser-extension, Introduction to cyber security. Information management-Create a repository using Google Drive.					3
Ex No 8 a) Scheduling–meetings–Google Calendar. b) Mail–Gmail c) Information management- Collection of student Bio data using google forms					4
Ex No 9 Hands-on Video Conferencing Experience with Webex, zoom, Google Meet etc (Any one tool for board practical examination).					4
Ex No 10 Password protection for sheets, Google drive sharing–permission.					4
Internal Assessment					4
TOTAL HOURS					**60**

Text Books

- NCERT, Chapter 1-3: Computer System, Encoding Scheme and Number Systems, Emerging Trends, Class XI, 2023.
- Carey, P., Des Jardins, C., Shaffer, A., Shellman, M. and Vodnik, S., New Perspectives Microsoft Office 365 & Office 2019: Introductory. Cengage Learning. ISBN:978-0357025741

Reference Book

- LawrenceMiller,KevinStrohmeyer,andMarkMargevicius,DigitalWorkspace,2019 by John Wiley & Sons Inc., Hoboken, NewJersey
- AnandShinde , Introduction to Cyber Security : Guide to the World of Cyber Security, Notion Press, 1st edition, 2021, ISBN:978-1637816424.

Web-based/Online Resources

https://www.futurelearn.com/info/blog/the-complete-guide-to-digital-skills
https://applieddigitalskills.withgoogle.com/ https://resources.owllabs.com/blog/video-conferencing-tools https://www.canva.com/
https://www.figma.com/

BEH 173	Digital Workplace Skills	L	T	P	C
Practical		0	0	4	2

Allocation of Marks for End Semester Examinations

Part	Description	Marks
Fitting / Wiring / Plumbing		
A	Aim	5
B	Procedure	25
C	Execution	20
D	Result	5
E	Viva-voce	5
TOTAL MARKS		**60**

SEMESTER-II

FOUNDATION COURSES

BEH201	தமிழரும் தொழில் நுட்பமும்	L	T	P	C
Theory	[Tamil and Technology]	2	0	0	2

Introduction

This course provides an opportunity for students who have Tamil as their mother tongue and for students from other states to have multifold outcomes. Learning in the mother tongue is a key factor for inclusion and quality learning, and it also improves learning outcomes and academic performance. This is crucial, for appreciation of Tamil as a language and as a culture. It fosters mutual understanding and respect for one another and helps preserve the wealth of cultural and traditional heritage that is embedded in Tamil language around the world.

Course Objectives

The objective of this course is to enable the student to

- Appreciate weaving and ceramic technology
- Learn the design and construction technology of ancient times
- Understand the engineering principles of manufacturing technology
- Introduce the methods of irrigation and agricultural technology
- Learn the scientific tamil and tamil computing

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Explain the principles behind weaving and ceramic technology of ancient tamils

CO2: Correlate the present and ancient design and construction technology

CO3: Apply engineering principles to ancient manufacturing technology

CO4: Apply engineering principles to irrigation and agricultural technology

CO5: Develop scientific tamil and new techniques in tamil computing

BEH201	தமிழரும் தொழில் நுட்பமும்	L	T	P	C
Theory	**[Tamil and Technology]**	**2**	**0**	**0**	**2**

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3				2	2	
CO2	3		2		2	2	
CO3	3	2			2		
CO4	3			2		3	
CO5	3						3

Legend:3-High Correlation, 2-Medium Correlation, 1-Low Correlation

BEH201	தமிழரும் தொழில் நுட்பமும்	L	T	P	C
Theory	[Tamil and Technology]	2	0	0	2

Assessment Methodology

	Continuous Assessment Test (40marks)			End Semester Examination (60 marks)
	CAT 1	CAT 2	CAT 3 (Model)	
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

BEH201	தமிழரும் தொழில் நுட்பமும்	L	T	P	C
Theory	[Tamil and Technology]	2	0	0	2

அலகு 1	நெசவு மற்றும் பனைத்தொழில்நுட்பம்	
சங்க காலத்தில் நெசவுத்தொழில் - பனைத்தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்கள் கீறல் குறியீடுகள்.		5
அலகு 2	வடிவமைப்பு மற்றும் கட்டிடதொழில்நுட்பம்	
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் வடிவமைப்பு மற்றும் கட்டிடதொழில்நுட்பம். சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களின் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர்காலத்துப் பெருங்கோவில்கள் மற்றும் பிற வழிபாட்டு தலங்கள் - நாயக்கர் காலக் கோவில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக்கலை.		7
அலகு 3	உற்பத்தி தொழில்நுட்பம்	
கப்பல் கட்டும் கலை - உலோகவியல் - இரும்பு தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.		6
அலகு 4	வேளாண்மை மற்றும் நீர்ப்பாசனத்தொழில்நுட்பம்	
அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தும்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.		6
அலகு 5	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	
அறிவியல் தமிழின் வளர்ச்சி - கணினித்தமிழ் வளர்ச்சி - தமிழ் நூல்கள் மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத்திட்டம்.		6

BEH201	தமிழரும் தொழில் நுட்பமும்	L	T	P	C
Theory	**[Tamil and Technology]**	**2**	**0**	**0**	**2**

TOTAL HOURS	**30**

Unit I	WEAVING AND CERAMIC TECHNOLOGY	
Weaving Industry during Sangam Age–Ceramic technology–Black and Red Ware Potteries (BRW) – Graffiti on Potteries.		5
Unit II	**DESIGN AND CONSTRUCTION TECHNOLOGY**	
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)-Thirumalai Nayakar Mahal-Chetti Nadu Houses, Indo-Saracenic architecture at Madras during British Period.		7
Unit III	**MANUFACTURING TECHNOLOGY**	
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel - Copper and gold coins as source of history - Minting of Coins–Beads making-industries Stone beads-Glass beads-Terracotta beads-Shellbeads/bone beats-Archeological evidences-Gemstone Types described in Silappathikaram.		6
Unit IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing-Knowledge of Sea-Fisheries–Pearl-Conche diving-Ancient Knowledge of Ocean-Knowledge Specific Society.		6
Unit V	**SCIENTIFIC AND TAMIL COMPUTING**	
Development of Scientific Tamil-Tamil computing–Digitalization of Tamil Books–Development of Tamil Software–Tamil Virtual Academy–Tamil Digital Library–Online Tamil Dictionaries–Sorkuvai Project		6
TOTAL HOURS		**30**

BEH201	தமிழரும் தொழில் நுட்பமும்	L	T	P	C
Theory	[Tamil and Technology]	2	0	0	2

Reference

- தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை [வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்]

- கணினித் தமிழ் - முனைவர் இல. சுந்தரம் [விகடன் பிரசுரம்]

- கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் [தொல்லியல் துறை வெளியீடு]

- பொருநை - ஆற்றங்கரை நாகரிகம் [தொல்லியல் துறை வெளியீடு]

- Social Life of Tamils [Dr. K. L. 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]

- Historical Heritage of the Tamils [Dr.S.V. Subataramanian, Dr.K.D. Thirunavukkarasu] [Published by: International Institute of Tamil Studies]

- The Contributions of the Tamils to Indian Culture [Dr.M. Valarmathi] [Published by: International Institute of Tamil Studies]

- Keeladi – 'Sangam City Civilization on the banks of river Vaigai' [Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services]

- Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K. Pillay) (Published by: The Author)

- Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

- Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Publishedby:RMRL) – Reference Book.

BEH271	**Communicative English II**	**L**	**T**	**P**	**C**
Practicum		**1**	**0**	**2**	**2**

Introduction

Communication is the foundation for all human relationships and language is one of the prime tools of communication. Effective Communication relies on cognitive skills such as eloquent speech, vocabulary, reading comprehension and critical thinking. The current syllabus focuses on emphasizes Language Skills Listening, Speaking, Reading, and Writing. It enables the students to shed their inhibitions be confident in their approach and acquire the skills to build good working relationships in their career. It helps the student at the Diploma level to gain confidence and enhance them to face their career commitments with globalized standards.

Course Objectives

The objective of this course is to enable the students to

- Improve the communicative competence in English.
- Enhance the vocabulary and Listening and Speaking Skills.
- Foster their confidence in group communication skills.
- Learn the techniques of effective writing.
- Enable them to communicate effectively and appropriately in real-life situations.

Course Outcomes

On successful completion of this course, the students will be able to

CO1:	Communicate effectively using appropriate vocabulary and grammar across various context.	PO1
CO2:	Identify and analyze sentences and its grammatical components	PO2
CO3:	Apply the techniques of effective writing in professional setting.	PO3, PO4
CO4:	Express themselves confidently in group communication.	PO6
CO5:	Practice and apply Listening, Speaking, Reading and Writing skills in real life situations.	PO7

Pre-requisites

Nil

BEH271	Communicative English II	L	T	P	C
Practicum		1	0	2	2

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2		3					
CO3			2	3			
CO4						3	
CO5							3

Legend:3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

The instructional strategy for Communicative English classes employs a learner-centered and communicative approach that focuses on active student participation and engagement. Here are some key strategies to be followed.

- **Communicative Activities:** Activities that develop active vocabulary and encourage role plays and language games for every day applications.
- **Pair and Group Work:** Promotes student interaction in a confident way in day-to-day conversation. It also reinforces their language skills through communication with their peers.
- **Authentic Materials:** News articles, videos, and podcasts develop comprehension and critical thinking skills.
- **Task-Based Learning:** Implement task-based learning activities for students and use English for real-world purposes.
- **Language Output and Output Balance**: Ensure a balance between language input like exposure to domain-specific vocabulary and grammar structures with examples. Enable language output by giving opportunities for students to build both receptive skills (Listening and Reading) and productive skills (Speaking and Writing).
- **Use of Technology:** Technology tools and resources such as language learning Applications, online platforms, and virtual communication tools can be used to provide practice opportunities.
- **Regular Assessment:** Formative and Summative assessments are conducted to gauge students' progress and encourage them in their language learning journey

BEH271	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Assessment Methodology

	Continuous Assessment (40marks)				End Semester Examination (60 Marks)
	CA1	CA2	CA3	CA4	
Mode	Lab Assessment	Lab Assessment	Model Exam	Record	Practicum Exam
Duration	2 Hours		2 hours 30 Minutes	-	2 hours 30 Minutes
Exam Marks	40 (Theory-20+ Practical-20)	40 (Theory-20+ Practical-20)	60 (Theory-30+ Practical-30)	20	30 (Theory-30+ Practical-30)
Converted to	10	10	10	-	60
Marks	10 (Best of CA1 & CA2)		10	20	60

- **CA3**-Model Exam (Unit I, II, III, IV & V)–Speaking Skills and Reading Skills.
- **CA4**-Model Exam (Unit I, II, III, IV & V)–Theory, Listening Skills and Writing Skills.
- **End Semester Examination**
  - o **Oral** (Speaking and Reading Skills)
  - o **Written** (Theory, Listening Skills and Writing Skills)
- Selected lists will be provided in the e-Text Book wherever mentioned.

BEH271	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Unit I	SITUATIONAL ENGLISH	

Theory(Prose):
Science Fiction Story [Any Short Story with Technical Words]
Focus on:
  a) Technical words[Textual]
  b) Conversions: Nouns, Verbs, Adjectives and Adverbs using affixes
     [Textual/General]
	3

PRACTICAL (Lab/Activity) Exercise No:1	

Listening
a) Listening to Scientific and Technological Passages.
   • Minimum4 passages
   • Conversions: Nouns, verbs, adjectives, and adverbs using affixes
   • Minimum5 conversions from each of the 4 passages
b) One Word Substitution[Technical]
   • Minimum 5 words from each passage
       (To be recorded in the Record Notebook)
	6

Speaking a) Process Description • Making of working models and Lab procedures b) Situational dialogues: WH, Yes or No and Question Tags	
Reading Short passages based on Professional Ethics	

Writing
a) Collocations of Technical Words (Match the Collocations)
   • With 5 words in one set
   • A selected list of 25 Collocations will be provided
b)Punctuations, Abbreviations and Acronyms
   • Sentences and Passages	

Unit II	FUNCTIONAL ENGLISH	

Theory(Poem): The Bangle Sellers by Sarojini Naidu
Focus on:
  a) Poetry Comprehension (poetry lines to be given with related questions to be
    answered in one or two lines)
  b) Introduction to Descriptive Adjectives
  c) Fill in the blanks with suitable forms of adjectives (General)
	3

Listening Listening to Lyrical Poems and noting down the Descriptive Adjectives	

PRACTICAL (Lab/Activity) Exercise No:2	

Speaking
a) Telephone Etiquette
   • Telephone Etiquette and Telephonic Conversation
   • Frame a Telephonic conversation with minimum 5 exchanges
	6

BEH271	**Communicative English II**	**L**	**T**	**P**	**C**
Practicum		**1**	**0**	**2**	**2**

b) Homophones and their meanings(General) • A selected list of 25 homophones will be provided (To be recorded in the Record Notebook)	
Reading a) Reading Comprehension(News Paper Editorials) Questions and Answers, Synonyms/ Antonyms, Completing the Sentence b) Newspaper Reading Practice is to be given.	6
Writing a) Resume writing b)Email writing (Business Letters and Job Application and Covering Letters)	

Unit III	EXPRESSIVE ENGLISH	

Theory(Prose): Narrative Essay: 'On Saying Please' by A.G. Gardiner **Focus on:** a) MCQs(based on the Prose) b) Short questions with one or two-line answers(Prose) c) Reporting Dialogues • Textual/General • Change into Reported Speech **Listening:** • Listen to Scientific Passages (Questions and Answers) **Speaking:** (a) Facing an Interview • Preparations(Checklist) (b)Body Language (Personal Etiquette) • Mock Interviews (Practical Model to be given)	3
PRACTICAL (Lab/Activity) Exercise No:3	
Reading • Reading Idiomatic Expressions with their meanings. • Matching the idioms with their meanings • 5 Idioms in each set • A selected list of 25 idioms with their meanings will be provided (To be recorded in the Record Notebook)	6
Writing • Info graphics/Picture • Reading(General/Technical) (Comprehending it as a Paragraph)	

Unit IV	EFFECTIVE ENGLISH	

Theory(Prose): General Prose Passage (Speech by a famous Indian Personality) **Focus on:** • Identification of Types of Sentences • Four Types: Assertive, Interrogative (Wh -type and Yes or No type), Imperative and Exclamatory (Textual/General)	3

BEH271	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Listening: Speeches of Great Personalities(Note-Taking)	
Speaking: • Group Discussion (General Topics: Environmental and Creating Awareness)	
Reading: • Reading various types of sentences with into nation [Four Types: Assertive, Interrogative (Wh-type and Yes or No type) Imperative and Exclamatory (Falling Tone and Rising Tone)]	
PRACTICAL (Lab/Activity) Exercise No:4	
Writing • Advertisement Writing, Caption Writing, Poster Presentation (Classifieds: Educational, Rental, Real Estate, Automotive & Business Offers) • Minimum one from each classified (To be recorded in the Record Notebook)	6

Unit V	CREATIVE ENGLISH	
Theory: Passages on Motivational Topics (Minimum3) **Focus on**: a) Identification of Phrasal Verbs from the passages.(Textual) b) Phrasal Verbs[General] • Framing sentences using the Phrasal Verbs: Textual and General • A selected list of 25 Phrasal Verbs will be provided under General Category		3
Listening Listening to the Weather Reports (Fill up the information gaps)		
PRACTICAL (Lab/Activity) Exercise No:5		
Speaking • Drafting a speech - Upcoming Trends (in their respective Branches) • Describing Oneself-Physical Features, Character Traits, Likes and Dislikes (Describe in Points under each aspect) (To be recorded in the Record Notebook)		6
Reading • Interpreting Graphics into Verbal (Pie Chart/Bar Diagram/Flow Chart)		
Writing (a) Completing a story (b) Caption writing for News Reports		
TOTAL HOURS		45

BEH271	**Communicative English II**	L	T	P	C
Practicum		1	0	2	2

Incorporate some of these activities in the Language Class

- New Words and Meanings
- Proverbs and its Meanings
- Contextual Vocabulary
- Frequently Mispronounced Words
- Cross Word Puzzles (General/Technical)
- Abbreviations (social media)
- News paper Reading Practice
- Debates

Suggested List of Student Activities

- Presentation/Seminars by students on any recent technological developments based on the branch of study.
- Quizzes are to be conducted based on the course on a weekly/fortnightly basis.
- Role Plays to Practice Speaking and Listening Skills.
- Descriptive Presentations about a specific topic using appropriate vocabulary.
- Language Games like word puzzles, vocabulary quizzes, and interactive games.
- News Discussions to express their opinions on several topics.
- Collaborative writing promote steam work which improves writing skills.

References

- Cambridge English Skills: Real Listening and Speaking by Miles Craven
- Writing Better English for ESL Learners by EdSwick
- English Grammar in Use by Raymond Murphy
- Practical English Usage by Michael Swan
- Oxford Basics – Simple Reading Activities by Jill Hadfield. Charles Hadfield
- Oxford Basics – Simple Speaking Activities by Jill Hadfield, Charles Hadfield

Web-based/Online Resources

- https://www.bbc.co.uk/learningenglish/

- https://www.fluentu.com/

- https://www.englishclub.com/

BEH273	APPLIED MATHEMATICS – I	L	T	P	C
Practicum	[Non-circuit Branches]	1	0	4	3

Introduction

This course is designed to give a comprehensive coverage at an introductory level to the topics of Coordinate Geometry, Differential Calculus, Integral Calculus and Statistical Process Control and some of their applications to engineering domains.

Course Objectives

The objective of this course is to enable the students to

- Acquire the knowledge of Geo Gebra.
- Acquire the knowledge of Coordinate Geometry, Differential Calculus, Integral Calculus and Statistical Process Control concepts to implement them in their core domain.
- Appreciate the importance of Coordinate Geometry, Differential Calculus, Integral Calculus and Statistical Process Control in their core domain.

Course Outcomes

After successful completion of this course, the students should be able to

	Define and explain the fundamental concepts of Coordinate Geometry, Differential Calculus, Integral Calculus and Statistical Measures	
CO1	Apply the concepts of Coordinate Geometry, Differential Calculus, Integral Calculus and Statistical Measures in solving problems.	PO1
CO2	Identify and Apply the mathematical concepts in their core domain	PO2
CO3	Demonstrate the understanding of Coordinate Geometry, Differential Calculus, Integral Calculus and Statistical Process Control through Geo Gebra.	PO4, PO7

Pre-requisites

High School Mathematics

BEH273	APPLIED MATHEMATICS – I	L	T	P	C
Practicum	[Non-circuit Branches]	1	0	4	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2		2					
CO3				3			1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

● Use explicit instruction for developing Math vocabulary and conceptual understanding.

● Use inductive-deductive approach to achieve the desired learning objectives.

● Use open-ended questions to nurture the problem-solving and reasoning skills among students.

● A theory-demonstrate-practice-activity strategy may be used throughout the course to ensure that learning is outcome-based and employability-based.

● Encourage students through illustrated problems and hand-on activities to use visual methods and simulations to solve real problems.

BEH273	APPLIED MATHEMATICS - I	L	T	P	C
Practicum	**[Non-circuit Branches]**	1	0	4	3

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CAT 1	**CAT 2**	**CAT 3**	**CAT 4**	
Mode	Practical	Practical	Model	Practical observation note book (Ex-1 to 10)	Practical
Duration	2 hours		2 hours 30 Minutes	___	2 hours 30 Minutes
Exam Marks	50 (Theory-10 + Practical-40)	50 (Theory-10 + Practical-40)	60 (Theory-20 + Practical-40)	100	60 (Theory-20+ Practical-40)
Converted to	10	10	10	20	60
Marks	10 (Best of CA1 & CA2)		10	20	60

Note:

1) One practical exercise question shall be given for each CA1and CA2. The mark allocation is Aim: 5 marks, Procedure: 15 marks, Output: 15 marks, Vivo –voce: 5 marks.

2) 8 questions shall be given from the theory portion for CA1and CA2, out of which 5- have to be answered. Each question carries 2 marks.

3) Each experiment should be evaluated for 10 marks in practical observation note book.

4) Submission of practical observation note book to end semester practical exam is mandatory.

BEH273	APPLIED MATHEMATICS –I	L	T	P	C
Practicum	**[Non-circuit Branches]**	**1**	**0**	**4**	**3**

Unit I	COORDINATE GEOMETRY - 1

THEORY Equation of a circle with given centre and radius – General equation of circle – Centre and radius of a circle from general equation – Concentric circles –Equations of Tangents-Contact of circles – Orthogonal circles – Simple problems.	**3**

PRACTICAL Basics of Geo Gebra (Not for examinations) • Familiarize the interfaces of Geo Gebra such as Graphics View, Algebra View, Graphics2, Spreadsheet, Computer Algebra System (CAS), Probability Calculator and 3D Graphics. • Familiarize the Tool Bar and important tools of Geo Gebra.	**5**

Exercise No:1 For the given equations of the circles $x^2 + y^2 + 2g_1x + 2f_1y + c_1 = 0$ and $x^2 + y^2 + 2g_2x + 2f_2y + c_2 = 0$ with appropriate coefficients, 1. Graph the equations of the circles in the Cartesian plane. 2. Determine the coordinates of the centres and radii of the circles and mark them on the graph. 3. Determine the distance between the centres of the circles. 4. Determine whether the circles are touching each other or not. 5. If the circles are touching each other, determine whether they are touching internally or externally. 6. Verify whether any of the relationships $C_1C_2 = r_1 + r_2$ or $C_1C_2 = |r_1 - r_2|$ holds or not.	**5**

Exercise No:2 For the given equations of the circles $x^2 + y^2 + 2g_1x + 2f_1y + c_1 = 0$ and $x^2 + y^2 + 2g_2x + 2f_2y + c_2 = 0$ with appropriate coefficients, 1. Graph the equations of the circles in the Cartesian plane. 2. Determine the points of intersection of circles. Let the points of intersections be A and B. 3. Draw the tangents to the circles at A. Measure the angle between their tangents at the point A. Verify whether angle between the tangents at A is 90°or not.	**6**

4. Draw the tangents to the circles at B. Measure the angle between their tangents at the point B. Verify whether angle between the tangents at B is 90°or not. 5. Verify whether the circles intersect orthogonally or not. 6. Verify whether $2g_1g_2 + 2f_1f_2 = c_1 + c_2$ is true or not.	
Unit II **COORDINATE GEOMETRY - 2**	
THEORY General equation of conics – Classification of conics – Standard equations of parabola – Vertex, focus, axis, directrix, focal distance, focal chord, latus- rectum of parabola – Standard equations of ellipse –Vertices, foci, major axis, minor axis, directrices, eccentricity, centre and latus-rectums of ellipse– Simple problems.	**3**

PRACTICAL
 	
Exercise No:3
 	
Do the following activities.
 	
   1. Draw the graphs of the parabolas $(y - k)^2 = 4a(x - h)$ and $(x - h)^2 = 4a(y - k)$ for the given values of a, b, h and k. Determine the vertex, focus, axis, directrix, latus- rectum of each parabola and mark them on the graphs.
   2. Draw the graphs of the ellipse $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ for the given values of a, b, h and k. Determine the eccentricity, centre, foci, vertices, major axis, minor axis, directrices, and latus-rectums and mark them on the graph.
	5

Exercise No:4
 	
Do the following activities for the given image of a parabolic shaped arch.
 	
   1. Draw a parabola which fits the given arch.
   2. Write the equation of the parabola.
   3. Find the vertex, focus, directrix and latus-rectum and mark them on the graph.
   4. Find the height and width of the arch.
	6

Unit III **DIFFERENTIAL CALCULUS**	
THEORY Limits of polynomials and rational functions – Limits of the form $\lim\limits_{x\to0} \frac{\sin ax}{bx}$ and $\lim\limits_{x\to0} \frac{\tan ax}{bx}$ (x in radians) (results only) – Definition of Continuity – Definition of differentiability – Differentiation formulae for standard functions – Differentiation of sum, difference, product and quotient of functions – Chain rule – Second order derivatives – Radius of curvature – Simple problems.	**3**

PRACTICAL
 	
Exercise No:5
 	
Do the following activities.
 	
    1. Graph the polynomial function $f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$, where $a_n,\ a_{n-1}, \ldots, a_0$ are real and $a_n \neq 0$. Find the value of $f(x)$ at $x = a$ and the limit of $f(x)$ at $x = a$.
 	
    2. Graph the rational function $R(x) = \frac{a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0}{b_m x^m + b_{m-1} x^{m-1} + \cdots + b_1 x + b_0}$, where $a_n,\ a_{n-1}, \ldots, a_0, b_m,\ b_{m-1}, \ldots, b_0$ are real and $a_n,\ b_m \neq 0$. Find the value of $f(x)$ and the limit of $f(x)$ at $x = a$.
 	
    3. Graph the functions $\frac{\sin ax}{bx}$ and $\frac{\tan ax}{bx}$ where a and b are real numbers and $a, b \neq 0$. Evaluate $\lim\limits_{x \to 0} \frac{\sin ax}{bx}$ and $\lim\limits_{x \to 0} \frac{\tan ax}{bx}$.
 	
    4. Graph the functions $c\ (constant)$, x^n, $\sin x$, $\cos x$, $\tan x$, $\operatorname{cosec} x$, $\sec x$, $\cot x$, e^x and $\log x$. Find their first derivative and second derivative.
 	
Note: Only two functions will be given in Board Practical Examination in subdivision- (4) of Ex-5.
	5

Exercise No:6
 	
Two parallel straights of $'x'$ m apart are to be connected by a reverse curve consisting of arcs of same radius. The distance between the end points of the curve is $'y'$ m.
 	
    1. Find the approximate value of the common radius.
    2. Find the length of the whole curve.
	6

Unit IV **INTEGRAL CALCULUS**	
THEORY Integration formulae of standard functions as inverse operation of differentiation – Bernoulli's formula – Definite integrals (Properties are excluded) – Area and volume using integration – Simple problems.	**3**

PRACTICAL
 Exercise No:7:
Do the following activities.
    1) Graph the functions $c\ (constant)$, $x^n, n \in \mathbb{R}$, e^x, $\sin x$, $\cos x$, $\sec^2 x$, $\operatorname{cosec}^2 x$, $\sec x \tan x$ and $\operatorname{cosec} x \cot x$. Find their indefinite integrals.
    2) Evaluate the definite integral $\int_a^b f(x)\, dx$ and relate it to the area under the curve $y = f(x)$ between x-axis, $x = a$ and $x = b$.
    3) Find the volume of the solid generated by the revolution of the area bounded by $y = f(x)$, x-axis, $x = a$ and $x = b$ about x-axis.
Note: Only two functions will be given in Board Practical Examination in subdivision-(1) of Ex-7.
	5

Exercise No:8	

Do the following activities for the given image of a closed irregular plane figure.
    1. Mark the required number of points on the boundary of the figure.
    2. Draw the boundary of the figure by joining the points.
    3. Divide the figure into trapeziums using the points on the boundary.
    4. Calculate the approximate area of the figure.
	6

Unit V	STATISTICAL PROCESS CONTROL	

THEORY	
Random variables – Continuous random variables – Normal distribution – Process average and process variation using arithmetic mean and variance – Central line (CL), upper control limit (UCL) and lower control limit (LCL) – Control charts $-\bar{X}$ charts– Out of control signals –Simple problems.	**3**

PRACTICAL	

Exercise No:9
 	
Do the following activities.
    1. Find the mean μ for the given data $x_1, x_2, x_3, \ldots, x_{50}$ of size $N = 50$.
    2. Find the variance σ^2 and standard deviation σ for the data given in (1).
    3. Fit the normal curve $f(x) = N(\mu, \sigma^2) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}, -\infty < x < \infty$.
    4. Calculate the probability $p = P(X_1 < X < X_2)$ for some X_1, X_2 in the range of the data given in (i) using the formula $\int_{X_1}^{X_2} f(x)dx$. Verify the answer using probability calculator.
    5. Calculate the number of data points in the interval (X_1, X_2) using the formula $n = N$
	5

Exercise No:10	
Consider the 4 samples each of size 5 taken from the production lot of a machine.	**6**

Sample Number	S_{i1}	S_{i2}	S_{i3}	S_{i4}	S_{i5}
S_1	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
S_2	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}
S_3	x_{31}	x_{32}	x_{33}	x_{34}	x_{35}
S_4	x_{41}	x_{42}	x_{43}	x_{44}	x_{45}

i. Calculate the sample means $\bar{S}_1, \bar{S}_2, \bar{S}_3, \bar{S}_4$ and the mean of the sample means $\bar{S} = \frac{\bar{S}_1 + \bar{S}_2 + \bar{S}_3 + \bar{S}_4}{4}$.

ii. Calculate the sample variances v_1, v_2, v_3, v_4 and $\sigma = \sqrt{\frac{1}{4}\sum_{i=1}^{4} v_i}$.

Determine the central line $CL = \bar{S}$, lower control limit $LCL = \bar{S} - \frac{2.58}{\sqrt{5}}\sigma$ and upper control limit $UCL = \bar{S} + \frac{2.58}{\sqrt{5}}\sigma$. Draw the $\bar{X}$ chart and determine the out-of control signals.	
TOTAL HOURS	**75**

Note: While setting up the practical exercise questions, the course teacher/examiner shall assign appropriate functions/constants wherever they are not mentioned explicitly.

Suggested List of Students Activities

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.
- Explore the working principle of gear wheels in laboratory.
- Find the equation of a parabolic bridge using Geo Gebra simulation
- Find the volume of a water bottle using Geo Gebra simulation of the image of the bottle.
- Collect samples from an industry and draw $\bar{X}$ chart for the data.

References
1. Higher Secondary First Year Mathematics Volume-I & Volume-II, Tamil Nadu Textbook and Educational Services Corporation, Government of Tamil Nadu, 2022.
2. Higher Secondary Second Year Mathematics Volume-I & Volume-II, Tamil Nadu Textbook and Educational Services Corporation, Government of Tamil Nadu, 2022.
3. John Bird, Higher Engineering Mathematics, Newnes (Elsevier), 6th Edition, 2010.
4. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
5. Deepak Singh, Mathematics-I, Khanna Book Publishing Co. (P) Ltd., 2021.
6. Garima Singh, Mathematics-II, Khanna Book Publishing Co. (P) Ltd., 2021.
7. John Vince, Calculus for Computer Graphics, Second Edition, Springer, 2019.
8. Geo Gebra Manual, The Official Manual of Geo Gebra (PDF Version), 2016.
9. Geo Gebra Handbook for Senior Secondary Mathematics Teachers, Regional Institute of Education, Mysuru, 2016.
10. Steve Phelps, An Introduction to Geo Gebra, Geo Gebra Institute of Ohio, University of Cincinnati.

Web-based/Online Resources

1. https://www.khanacademy.org/math/
2. https://www.mathportal.org/
3. https://openstax.org/subjects/math
4. https://www.mathhelp.com/
5. https://www.geogebra.org/
6. https://www.desmos.com/
7. https://phet.colorado.edu/

BEH273	APPLIED MATHEMATICS – I	L	T	P	C
Practicum	[Non-circuit Branches]	1	0	4	3

Hardware Requirement

- Desktop Computers: 30 + 2 Nos.
- Projector and Screen
- Printer

Software Requirement

- Operating System: Windows 7 or later
- Geo Gebra Classic 5 (Free version)

Allocation of Marks for End Semester Exam

Part	Description	Marks
A	Written Test (Theory Portion)	20
B	Aim	5
C	Procedure	15
D	Output	15
E	Viva-voce	5
Total		**60**

Note:

- 15 questions shall be given from the theory portion, out of which 10 have to be answered. Each question carries 2 marks.
- One practical exercise question along with respective unfilled output table(s) shall be given from practical exam.

BEH272	APPLIED MATHEMATICS – II	L	T	P	C
Practicum	[Circuit Branches]	1	0	4	3

Introduction

This course is designed to give a comprehensive coverage at an introductory level to the topics of Coordinate Geometry, Trigonometry, Complex Numbers, Differential Calculus and Integral Calculus and some of their applications to engineering domains.

Course Objectives

The objective of this course is to enable the students to

- Acquire the knowledge of Geo Gebra.
- Acquire the knowledge of Coordinate Geometry, Trigonometry, Complex Numbers, Differential Calculus and Integral Calculus to implement them in their core domain.
- Appreciate the importance of Coordinate Geometry, Trigonometry, Complex Numbers, Differential Calculus and Integral Calculus in their core domain.

Course Outcomes

After successful completion of this course, the students should be able to

	Define and explain the fundamental concepts of Coordinate Geometry, Trigonometry, Complex Numbers, Differential Calculus and Integral Calculus	
CO1	Apply the concepts of Coordinate Geometry, Trigonometry, Complex Numbers, Differential Calculus and Integral Calculus in solving problems.	PO1
CO2	Identify and Apply the mathematical concepts in their core domain	PO2
CO3	Demonstrate the understanding of Coordinate Geometry, Trigonometry, Complex Numbers, Differential Calculus and Integral Calculus through Geo Gebra.	PO4, PO7

Pre-requisites

High School Mathematics

BEH272	APPLIED MATHEMATICS – II	L	T	P	C
Practicum	[Circuit Branches]	1	0	4	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2		2					
CO3				3			1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Use explicit instruction for developing Math vocabulary and conceptual understanding.
- Use inductive-deductive approach to achieve the desired learning objectives.
- Use open-ended questions to nurture the problem-solving and reasoning skills among students.
- A theory-demonstrate-practice-activity strategy may be used throughout the course to ensure that learning is outcome-based and employability-based.
- Encourage students through illustrated problems and hand-on activities to use visual methods and simulations to solve real problems.

BEH272	APPLIED MATHEMATICS – II	L	T	P	C
Practicum	**[Circuit Branches]**	**1**	**0**	**4**	**3**

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CAT 1	CAT 2	CAT 3	CAT 4	
Mode	Practical	Practical	Model	Practical observation note book (Ex-1 to 10)	Practical
Duration	2 hours		2 hours 30 Minutes	___	2 hours 30 Minutes
Exam Marks	50 (Theory-10 + Practical-40)	50 (Theory-10 + Practical-40)	60 (Theory-20 + Practical-40)	100	60 (Theory-20+ Practical-40)
Converted to	10	10	10	20	60
Marks	10 (Best of CA1 & CA2)		10	20	60

Note:

1. One practical exercise question shall be given for each CA1and CA2. The mark allocation is Aim: 5 marks, Procedure: 15 marks, Output: 15 marks, Vivo –voce: 5 marks.
2. 8 questions shall be given from the theory portion for CA1and CA2, out of which 5- have to be answered. Each question carries 2 marks.
3. Each experiment should be evaluated for 10 marks in practical observation note book.
4. Submission of practical observation note book to end semester practical exam is mandatory.

BEH272	APPLIED MATHEMATICS –II	L	T	P	C
Practicum	**[Circuit Branches]**	**1**	**0**	**4**	**3**

Unit I	COORDINATE GEOMETRY

THEORY General equation of conics – Classification of conics – Standard equations of parabola – Vertex, focus, axis, directrix, focal distance, focal chord, latus- rectum of parabola – Standard equations of ellipse –Vertices, foci, major axis, minor axis, directrices, eccentricity, centre and latus- rectums of ellipse – Simple problems.	**3**
PRACTICAL Basics of Geo Gebra (Not for examinations) • Familiarize the interfaces of Geo Gebra such as Graphics View, Algebra View, Graphics2, Spreadsheet, Computer Algebra System (CAS), Probability Calculator and 3D Graphics. Familiarize the Tool Bar and important tools of Geo Gebra.	**5**
Exercise No: 1 Do the following activities. (i) Draw the graphs of the parabolas $(y-k)^2 = 4a(x-h)$ and $(x-h)^2 = 4a(y-k)$ for the given values of a, b, h and k. Determine the vertex, focus, axis, directrix, latus-rectum of each parabola and mark them on the graphs. **(ii)** Draw the graphs of the ellipse $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ for the given values of a, b, h and k. Determine the eccentricity, centre, foci, vertices, major axis, minor axis, directrices, and latus-rectums and mark them on the graph.	**5**
Exercise No: 2 Do the following activities for the given image of a parabolic shaped satellite dish antenna. (i) Draw a parabola which fits the given image of the dish antenna. (ii) Write the equation of the parabola. (iii) Find the vertex, focus, directrix and latus-rectum and mark them on the graph. How far from the vertex should the receiver of the antenna be placed? Note: The dish antenna given in the image will be exactly open right side, left side or upside.	**6**

Unit II	INVERSE TRIGONOMETRIC FUNCTIONS	
THEORY Recapitulation of domain and range of $\sin x$, $\cos x$, $\tan x$, $\operatorname{cosec} x$, $\sec x$ and $\cot x$ and their graphs – Definition of sinusoidal function-Finding maximum value, minimum value, amplitude, period and phase shift - Definition of inverse trigonometric functions – Domain and range of $\sin^{-1} x$, $\cos^{-1} x$, $\tan^{-1} x$, $\operatorname{cosec}^{-1} x$, $\sec^{-1} x$, $\cot^{-1} x$ and their graphs – Principle values of inverse trigonometric functions – Simple problems.		**3**
PRACTICAL **Exercise No: 3** Do the following activities i. Draw the graphs of $A\sin(Bx + C)$ and $A\cos(Bx + C)$ for some fixed finite real values of A, B and C. Find their domain, range, maximum value, minimum value, amplitude, period and phase shift. ii. Draw the graphs of $\sin^{-1} x$ and $cos^{-1} x$. Find their domain, range, maximum value and minimum value.		**5**
Exercise No: 4 The alternating current passing through a circuit is $i(t) = I_m \sin \omega t$, where I_m is the maximum value of current and ω is the angular velocity. Let R be the resistance and V_m be the maximum voltage. 1. Graph the sinusoidal waveform of $i(t)$ for the given values of I_m and ω. 2. Calculate the maximum voltage V_m using the formula $V_m = I_m R$ for the given value of R. 3. Graph the sinusoidal waveform of voltage using the formula $v(t) = V_m \sin\left(\omega t + \frac{\pi}{2}\right)$. 4. Determine the value of root mean square (r.m.s) current using the formula $I_{rms} = I_m/\sqrt{2}$. 5. Determine the frequency using the formula $F = \omega/2\pi$. 6. Calculate the instantaneous value of the current at t sec.		**6**
Unit III	COMPLEX NUMBERS	
THEORY Definition of a complex number – Real and imaginary parts– Modulus and argument – Polar form of a complex number – Conjugate of a complex number – Representation of complex numbers on Argand plane –Addition, subtraction, multiplication and division of complex numbers – De-Moivre's theorem (without proof) - Simple problems.		**3**

PRACTICAL **Exercise No: 5** Do the following activities. 1. Mark the given complex number z on the Argand plane. Find the real and imaginary parts of z. Find the distance of z from x-axis and relate it to the real part of z. Find the distance of z from y-axis and relate it to the imaginary part of z. 2. Find the conjugate of z. Mark $\bar{z}$ on the Argand plane. Find the reflection of z on x-axis and relate it to $\bar{z}$. 3. Find the modulus of z. Find the distance between z and origin of the Argand plane and relate it to the modulus of z. Find the modulus of $\bar{z}$ and relate it to the modulus of z. 4. Find the argument of z. Find the angle between the line segment Oz and x axis and relate it to the argument of z. Find the argument of $\bar{z}$ and relate it to the argument of z.	**5**
Exercise No: 6 Do the following activities. i. The representation of apparent power as phasor sum of active power and reactive power is given by $S = 550 + 952.63j$. Draw the phasor diagram of the system. Find the numerical value of the apparent power. Also calculate the phase angle and power factor of the system. ii. A machine takes 10KW (real power, P) at a power factor of 0.6 from 400V supply. Calculate the total load in KVA (apparent power, S) and KVAR (apparent power, R). Represent the apparent power as a phasor sum of active power and reactive power. Note: The course teacher/examiner can assign appropriate values for S, P, power factor and supply in Ex-6.	**6**
Unit IV **DIFFERENTIAL CALCULUS**	
THEORY Limits of polynomials and rational functions – Limits of the form $\lim\limits_{x\to 0}\frac{\sin ax}{bx}$ and $\lim\limits_{x\to 0}\frac{\tan ax}{bx}$ (x in radians) (results only) – Definition of Continuity - Definition of differentiability – Differentiation formulae for standard functions – Differentiation of sum, difference, product and quotient of functions – Chain rule – Second order derivatives – Simple problems.	**3**

PRACTICAL

Exercise No: 7

Do the following activities.

(i) Graph the polynomial function $f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$, where $a_n, a_{n-1}, \ldots, a_0$ are real and $a_n \neq 0$. Find the value of $f(x)$ at $x = a$ and the limit of $f(x)$ at $x = a$.

(ii) Graph the rational function $R(x) = \frac{a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0}{b_m x^m + b_{m-1} x^{m-1} + \cdots + b_1 x + b_0}$, where $a_n, a_{n-1}, \ldots, a_0, b_m, b_{m-1}, \ldots, b_0$ are real and $a_n, b_m \neq 0$. Find the value of $f(x)$ and the limit of $f(x)$ at $x = a$.

(iii) Graph the functions $\frac{\sin ax}{bx}$ and $\frac{\tan ax}{bx}$ where a and b are real numbers and $a, b \neq 0$. Evaluate $\lim\limits_{x \to 0} \frac{\sin ax}{bx}$ and $\lim\limits_{x \to 0} \frac{\tan ax}{bx}$.

(iv) Graph the functions c (constant), x^n, $\sin x$, $\cos x$, $\tan x$, $\csc x$, $\sec x$, $\cot x$, e^x and $\log x$. Find their first derivative and second derivative.

Note: Only two functions will be given in Board Practical Examination in subdivision-(iv)of Ex-7.

5

Exercise No: 8

The alternating current passing through a circuit is $i(t) = I_m \sin \omega t$ where, I_m is the maximum value of current and ω is the angular velocity. Let L be the inductance.

(i) Graph the sinusoidal wave form of $i(t)$ for the given values of I_m and ω.

(ii) Graph the voltage using the formula $v(t) = L \frac{di(t)}{dt}$ for the given value of L.

(iii) Determine the values of $i(t)$ and $v(t)$ for a fixed t and different values of ω.

(iv) Determine the values of $i(t)$ and $v(t)$ for fixed value of ω and different values of t.

Determine the values of t for which $i(t)$ and $v(t)$ are equal.

6

Unit V	INTEGRAL CALCULUS

THEORY

Integration formulae of standard functions as inverse operation of differentiation – Bernoulli's formula – Definite integrals (Properties are excluded) – Area and volume using integration – Simple problems.

3

PRACTICAL

Exercise No: 9

Do the following activities.

i. Graph the functions c (constant), $x^n, n \in \mathbb{R}$, e^x, $\sin x$, $\cos x$, $\sec^2 x$, $\csc^2 x$, $\sec x \tan x$ and $\csc x \cot x$. Find their indefinite integrals.

5

ii. Evaluate the definite integral $\int_a^b f(x)\,dx$ and relate it to the area under the curve $y = f(x)$ between x-axis, $x = a$ and $x = b$. Graph the functions $c\ (constant)$, $x^n, n \in \mathbb{R}$, e^x, $\sin x$, $\cos x$, $\sec^2 x$, $\operatorname{cosec}^2 x$, $\sec x \tan x$ and $\operatorname{cosec} x \cot x$. Find their indefinite integrals. iii. Evaluate the definite integral $\int_a^b f(x)\,dx$ and relate it to the area under the curve $y = f(x)$ between x-axis, $x = a$ and $x = b$. iv. Find the volume of the solid generated by the revolution of the area bounded by $y = f(x), x$-axis, $x = a$ and $x = b$ about x-axis. **v.** Note: Only two functions will be given in Board Practical Examination in subdivision-(i) of Ex-9.	
Exercise No:10 Let V be the voltage, L be the inductance and R be the resistance of a circuit. i. Graph the function of current at time t using the formula $I(t) = \dfrac{V}{R}\left(1 - e^{-\frac{Rt}{L}}\right)$. ii. Graph the function of charge passing through the coil at time t using the formula $Q(t) = \int I(t)\,dt$. iii. Find the values of $I(t)$ and $Q(t)$ for given values of V, L and R at different t values. Find the values of $I(t)$ and $Q(t)$ at a fixed time for different values of V, L and R.	**6**
TOTAL HOURS	**75**

Note: While setting up the practical exercise questions, the course teacher/examiner shall assign appropriate functions/constants wherever they are not mentioned explicitly.

Suggested List of Students Activities

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Operate a cathode-ray oscilloscope (CRO) and visualize the formation of ellipse on the screen.
- Examine a satellite dish antenna and verify that the receiver is fixed at its focus.
- Draw the phase diagram and visualize the triangular relationship between apparent power, active power and reactive power.
- Find the height of a mountain using Geo Gebra simulation of the image of the mountain.
- Find the volume of a water bottle using Geo Gebra simulation of the image of the bottle.

References

- Higher Secondary First Year Mathematics Volume-I & Volume-II, Tamil Nadu Textbook and Educational Services Corporation, Government of Tamil Nadu, 2022.
- Higher Secondary Second Year Mathematics Volume-I & Volume-II, Tamil Nadu Textbook and Educational Services Corporation, Government of Tamil Nadu, 2022.
- John Bird, Higher Engineering Mathematics, Newnes (Elsevier), 6th Edition, 2010.

- Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
- Deepak Singh, Mathematics-I, Khanna Book Publishing Co. (P) Ltd., 2021.
- Garima Singh, Mathematics-II, Khanna Book Publishing Co. (P) Ltd., 2021.
- John Vince, Calculus for Computer Graphics, Second Edition, Springer, 2019.
- Geo Gebra Manual, The Official Manual of Geo Gebra (PDF Version), 2016.
- Geo Gebra Handbook for Senior Secondary Mathematics Teachers, Regional Institute of Education, Mysuru, 2016.
- Steve Phelps, An Introduction to Geo Gebra, Geo Gebra Institute of Ohio, University of Cincinnati.

Web-based/Online Resources

- https://www.khanacademy.org/math/
- https://www.mathportal.org/
- https://openstax.org/subjects/math
- https://www.mathhelp.com/
- https://www.geogebra.org/
- https://www.desmos.com/
- https://phet.colorado.edu/

BEH272	APPLIED MATHEMATICS – II	L	T	P	C
Practicum	[circuit Branches]	1	0	4	3

Hardware Requirement

- Desktop Computers: 30 + 2 Nos.
- Projector and Screen
- Printer

Software Requirement

- Operating System: Windows 7 or later
- Geo Gebra Classic 5 (Free version)

Allocation of Marks for End Semester Exam

Part	Description	Marks
A	Written Test (Theory Portion)	20
B	Aim	5
C	Procedure	15
D	Output	15
E	Viva-voce	5
Total		**60**

Note:

- 15 questions shall be given from the theory portion, out of which 10 have to be answered. Each question carries 2 marks.
- One practical exercise question along with respective unfilled output table(s) shall be given from practical exam.

BEH275	APPLIED PHYSICS – I	L	T	P	C
Mini Project	[NON-CIRCUIT BRANCHES]	1	0	2	2

Introduction

Any technological innovation happens through a firm understanding of basic science. Knowing and developing proper understanding of the scientific principles behind every technological gadget or instrument is inevitable to a polytechnic student. This course systematically introduces the laws of physics which gives correct perspectives of dealing with technology and its societal uses.

Course Objectives

The objective of this course is to enable the student to
1. Discuss the basics of rigid body dynamics
2. Explain the properties of fluids and its relevance to technological fields
3. Outline the relevance of acoustic principles, Doppler effects & its technological applications
4. Give basics of current, voltage and ohm's law and its applications in engineering field
5. Understand the basics of semiconductors.

Course Outcomes

On successful completion of this course, the students will be able to

	Understand the fundamental properties of rigid body and fluids and the concepts of acoustics and electricity	-
CO1	Compute the moment of inertia for common shapes about different axes.	PO1
CO2	Compare and analyse the energy band structures of conductors, semiconductors and insulators.	PO2
CO3	Plan and design sustainable solutions by applying theoretical knowledge of semiconductors.	PO3, PO5
CO 4	Execute mini projects and effectively communicate the same through a well-structured report and presentation.	PO4, PO6, PO7

Pre-requisites
High School Science

BEH275	APPLIED PHYSICS – I	L	T	P	C
Mini Project	[NON-CIRCUIT BRANCHES]	1	0	2	2

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2		3					
CO3			3		2		
CO4				3		3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.

- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications. Try to give source examples from where the students would be familiar - like sports, or an activity that they usually engage in frequently.

- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.

- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome- and employability-based.

- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where could be the source of error, if any.

BEH275	APPLIED PHYSICS – I	L	T	P	C
Mini Project	[NON-CIRCUIT BRANCHES]	1	0	2	2

Assessment Methodology

	Continuous Assessment (40marks)			End Semester Examination (60 marks)
	CAT 1	**CAT 2**	**CAT 3**	
Mode	Written Test (Theory)	Lab Assessment	Project Review	Mini Project
Duration	1½ hours		2 ½ hours	2 ½ hours
Exam Marks	30	30	60	60
Converted to	10	10	20	60
Marks	40			60

BEH275	APPLIED PHYSICS – I	L	T	P	C
Mini Project	[NON-CIRCUIT BRANCHES]	1	0	2	2

Unit I	PROPERTIES OF RIGID BODY AND FLUIDS

THEORY

Rigid boy – Centre of mass – Centre of gravity – Examples – Torque-Moment of inertia of a rigid body about an axis – Expression – radius of gyration – Moment of inertia of symmetric objects (thin rod, disc, ring, hollow and solid cylinder) – parallel and perpendicular axis theorem (no derivation)- Examples. Fluids – streamline flow, turbulent flow – critical velocity –Surface tension – application of capillarity – Viscosity -Definition and SI units- Coefficient of Viscosity – Reynolds number.

6

PRACTICAL

1. Determination of moment of inertia of disc using torsional pendulum.

4

2. Comparison of co-efficient of viscosity of two viscous liquids by Poiseuille's method.

Unit II	BASICS OF SOUND, ELECTRICITY AND SEMI CONDUCTORS

THEORY

Wave motion – audible range – infrasonic and ultrasonic – longitudinal, transverse and progressive waves – standing waves – free and forced vibration – laws of transverse vibration – acoustics of buildings – echo – reverberation – reverberation time – Sabine formula (no derivation) – Noise pollution - Doppler effect – applications. Current – Voltage - Ohm's law – resistance – resistivity – effective resistance – Kirchhoff current and voltage law – Wheatstone bridge – Joule's law of heating – applications of heating effect of electric current. Energy bands in conductor, semiconductor and insulator, chemical bonds in semiconductor, Intrinsic and extrinsic semiconductors, PN Junction Diode.

7

PRACTICAL

1. Find the output conditions for different combinations of the input for N NOT gate and 2 inputs AND, OR, NAND & NOR logic gates using IC chips.

4

2. Determination of Forward bias of a PN Junction Diode.

BEH275	APPLIED PHYSICS – I	L	T	P	C
Mini Project	[NON-CIRCUIT BRANCHES]	1	0	2	2

MINI PROJECT WORK (NON-CIRCUIT BRANCH) Mini Projects based on 1. Center of gravity 2. Fluid flow – streamline and turbulent 3. Surface tension 4. Viscosity 5. Resonance 6. Echo, reverberation, and acoustics 7. Electrical circuits 8. Semiconductors and PN junction diodes **Students must undertake one mini project from the above listed topics and submit the final report at the end semester. It will be evaluated by the External and Internal Examiners.**	15
Test & Assessment	9
TOTAL PERIODS	45

BEH275	APPLIED PHYSICS – I	L	T	P	C
Mini Project	[NON-CIRCUIT BRANCHES]	1	0	2	2

Suggested List of Students Activity

➤ Presentation/Seminars by students on any recent technological developments based on the course
➤ Periodic class quizzes conducted on a weekly/fortnightly based on the course
➤ Micro project that shall be an extension of mini projects to real-world application.

Reference

➤ XI and XII standard Tamilnadu State Board Physics Text Book, 2023 edition, Textbook Corporation Tamil Nadu.

➤ H.C.Verma, Concepts of Physics Vol 1 & Vol 2, Bharathi Bhavan Publishers, 1st edition, 2021.

Web-based/Online Resources

● https://youtu.be/Jtud5iwTd_I?si=zTGcQdimzT0FXtzY

● https://www.youtube.com/watch?v=nVPrWz8Jfgo&list=PLqwfRVlgGdFB
Vn3o5AmfJGhSv9NXM_XKc&ab_channel=khanacademymedicine

● https://www.youtube.com/watch?v=ZcZQsj6YAgU&list=PLqwfRVlgGdF
BHGEZdkmGzKGufuV5I3z0v&ab_channel=KhanAcademyPhysics

● https://www.youtube.com/watch?v=F_vLWkkOETI&list=PLqwfRVlgGdF
C7HLoajCVjUk23cqy4QvRL&ab_channel=KhanAcademy

BEH275	APPLIED PHYSICS – I	L	T	P	C
Mini Project	[NON-CIRCUIT BRANCHES]	1	0	2	2

Allocation of Marks for End Semester - Mini Project

Details of Mark allocation	Max Marks
Presentation	10
Demonstration	20
Report	20
Viva-Voce	10
TOTAL	**60**

Submission of Project Report for end semester Project is mandatory.

Allocation of Marks for CAT 1 and CAT 2

Part – A	Objective questions	10 x 1 marks	10 marks
Part – B	2 questions to be answered out of 4	2 x 10 marks	20 marks
TOTAL			**30 marks**

Allocation of Marks for CAT 3

S.NO	DESCRIPTION	MARK ALLOCATION
1.	Aim, Formula & Diagram	10
2.	Tabulation	3
3.	Observation	10
4.	Calculation	5
5.	Result	2
	TOTAL MARKS	30

BEH274	APPLIED PHYSICS – II	L	T	P	C
Mini Project	[CIRCUIT BRANCHES]	1	0	2	2

Introduction

This course will give the outline and applications of some important physics principles which are relevant for circuit polytechnic branches.

Course Objectives

The objective of this course is to

1. Outline the relevance of acoustic principles and doppler effect

2. Discuss the properties of light, refractive index, optoelectronic devices

3. Define Current, voltage, ohm's law and simple DC circuit

4. Introduces the basics of magnetism and Faraday law of Electromagnetic induction and its applications in engineering field.

5. Understand the basics of semiconductors.

Course Outcomes

On successful completion of this course, the student will be able to

	Understand the fundamental concepts of acoustics, electricity and Electromagnetic induction	-
CO1	Apply knowledge of lasers and fiber optics in day today life	PO1
CO2	Identify and analyse the energy band structures in conductors, semiconductors and insulators and to classify semiconductors based on their chemical bonds.	PO2
CO3	Plan and design sustainable solutions by applying theoretical knowledge of semiconductors.	PO3, PO5
CO4	Execute mini projects and effectively communicate the same through a well-structured report and presentation.	PO4, PO6, PO7

Pre-requisites

High School Science

BEH274	APPLIED PHYSICS – II	L	T	P	C
Mini Project	[CIRCUIT BRANCHES]	1	0	2	2

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2		3					
CO3			3		2		
CO4				3		3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy 3

● It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.

● To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.

● The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.

● Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome- and employability-based.

● Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

BEH274	APPLIED PHYSICS – II	L	T	P	C
Mini Project	[CIRCUIT BRANCHES]	1	0	2	2

Assessment Methodology

	Continuous Assessment (40marks)			End Semester Examination (60 marks)
	CAT 1	**CAT 2**	**CAT 3**	
Mode	Written Test (Theory)	Lab Assessment	Project Review	Mini Project
Duration	1½ hours		2 ½ hours	2 ½ hours
Exam Marks	30	30	60	60
Converted to	10	10	20	60
Marks	40			60

BEH274	APPLIED PHYSICS – II	L	T	P	C
Mini Project	[CIRCUIT BRANCHES]	1	0	2	2

Unit I	SOUND & OPTICS

THEORY Wave motion – audible range – infrasonic and ultrasonic – longitudinal, transverse and progressive waves – standing waves – free and forced vibration – acoustics of buildings – echo – reverberation – reverberation time – Sabine formula (no derivation) – Noise pollution – Doppler effect – applications. Reflection – Refraction – laws of reflection and refraction – refractive index of a medium – Total internal reflection – fiber optics –applications – Laser – Principle – applications – point lasers – remote sensing – RADAR – principle and applications – Sensors – Basics – various types – applications – Optoelectronic devices.	5

PRACTICAL
   1. Determination of frequency of tuning fork using sonometer
 	
   2. Draw the VI Characteristics of solar cell.
	4

Unit II	BASICS OF ELECTRICITY, MAGNETISM AND SEMI CONDUCTORS

THEORY Current – Voltage – Ohm's law – resistance – resistivity - effective resistance - Kirchhoff current and voltage law – Internal resistance of the cell – Joule's law of heating – applications of heating effect of electric current– Faraday law of electromagnetic induction – Inductor – self & mutual Inductance – applications – bar magnets – Pole strength – Magnetic moment – intensity of magnetization – magnetic field – types of magnetic materials and applications. Energy bands in conductor, semiconductor and insulator, chemical bonds in semiconductor, Intrinsic and extrinsic semiconductors, PN Junction Diode.	7

PRACTICAL
   1. Find the output conditions for different combinations of the input for N NOT gate and 2 inputs AND, OR, NAND & NOR logic gates using IC chips.
 	
   2. Determination of Forward bias of a PN Junction Diode.
	4

MINI PROJECT WORK (CIRCUIT BRANCH)	
Mini Projects based on 1. Resonance 2. Echo, reverberation, and acoustics 3. Fiber optics 4. LASER 5. Sensors 6. Electrical circuits 7. Faraday's Law of Electromagnetic induction 8. Semiconductors and PN junction diodes **Students must undertake one mini project from the above listed topics and submit the final report at the end semester. It will be evaluated by the External and Internal Examiners.**	**16**
Test & Assessment	**9**
TOTAL PERIODS	**45**

Suggested List of Students Activity

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Presentation/Seminars by students on any recent technological developments based on the course
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

Reference

- XI and XII standard Tamilnadu State Board Physics Text Book, 2023 edition, Textbook Corporation Tamil Nadu.
- H.C.Verma, Concepts of Physics Vol 1 & Vol 2, Bharathi Bhavan Publishers, 1st edition, 2021.

Web-based/Online Resources

- https://youtu.be/Jtud5iwTd_I?si=zTGcQdimzT0FXtzY
- https://www.youtube.com/watch?v=nVPrWz8Jfgo&list=PLqwfRVlgGdFBVn3o5AmfJGhSv9NXM_XKc&ab_channel=khanacademymedicine
- https://www.youtube.com/watch?v=ZcZQsj6YAgU&list=PLqwfRVlgGdFBHGEZdkmGzKGufuV5I3z0v&ab_channel=KhanAcademyPhysics
- https://www.youtube.com/watch?v=F_vLWkkOETI&list=PLqwfRVlgGdFC7HLoajCVjUk23cqy4QvRL&ab_channel=KhanAcademy

BEH274	APPLIED PHYSICS – II	L	T	P	C
Mini Project	[CIRCUIT BRANCHES]	1	0	2	2

Allocation of Marks for End Semester - Mini Project

Details of Mark allocation	Max Marks
Presentation	10
Demonstration	20
Report	20
Viva-Voce	10
TOTAL	**60**

Submission of Project Report for end semester Project is mandatory.
Allocation of Marks for CAT 1 and CAT 2

Part – A	Objective questions	10 x 1 marks	10 marks
Part – B	2 questions to be answered out of 4	2 x 10 marks	20 marks
TOTAL			**30 marks**

Allocation of Marks for CAT 3

S.NO	DESCRIPTION	MARK ALLOCATION
1.	Aim, Formula & Diagram	10
2.	Tabulation	3
3.	Observation	10
4.	Calculation	5
5.	Result	2
	TOTAL MARKS	30

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	(Non-Circuit Branches)	1	0	2	2

Introduction

This course will give the outline and applications of some important chemistry principles which are relevant for non-circuit polytechnic branches.

Course Objectives

The objective of this course is

1. To acquire skill on water quality parameter and art of water monitoring.
2. To understand basic knowledge on soft and hard water -EDTA experiment and scale formation.
3. To understand the harmful effects of heavy metal ions effluents and their health hazards.
4. To build understanding on methods of softening hard water- Ion exchange and reverse osmosis method and purification of drinking water

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Differentiate hard and soft water and estimate the total hardness in the given sample

CO2: Adopt suitable cost-effective methods for the softening of hard water

CO3: Identify the reasons for the hardness and check the standard of water

Quality parameters

CO4: Design a suitable model to address the disadvantage boiler scales

Pre-requisites

10th Standard Chemistry

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	(Non-Circuit Branches)	1	0	2	2

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	1	1	3
CO2	3	3	2	1	1	1	3
CO3	3	3	2	1	1	1	3
CO4	3	3	2	1	1	1	3

Legend:3- High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome- and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	(Non-Circuit Branches)	1	0	2	2

Assessment Methodology

	Continuous Assessment (40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practicum Exam	Practicum Exam	Model Exam	Practicum Exam
Duration	2 hours		2 hours 30 Minutes	2 hours 30 Minutes
Exam Marks	50 (Theory-20+Practical-30)	50 (Theory-20+Practical-30)	60	60
Converted to	20	20	20	60
Marks	Best one of CA1 and CA2 (20 marks)		20	60

Note:

- Average of CA1 and CA2 should be considered for the internal assessment of 20 marks

- CA 3 Model examination should be conducted as per the End Semester guidelines. The same should be considered for the internal assessment of 20 marks.

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	(Non-Circuit Branches)	1	0	2	2

Unit I	WATER ANALYSIS	
Sources of water – depletion of underground water – Reasons – Basic Idea of rain water harvesting - Hard water and soft water – Hardness of water – Carbonate and Non–carbonate hardness – Methods of expressing hardness – mg/lit and ppm – Estimation of total hardness by EDTA method –simple Problems on total hardness only- Disadvantages of using hard water in boilers –Scale formation, Corrosion of boiler metal, Caustic Embrittlement– Priming and Foaming (definition only).		6

Ex. No	Name of the Exercise	
1	Estimation of total hardness of water by EDTA method	
2	Determination of alkalinity of sample of hard water	12
3	Estimation of residual chlorine in a given water sample	
4	Estimation of oxalic acid by permanganometry	

Unit II	WATER TREATMENT	
Determination of residual chlorine in the given sample of hard water-identification of sulphate and chloride ions- identification of heavy metal ions in the given sample of effluent- Softening of hard water – Ion-Exchange method and Reverse Osmosis method – chemical methods of purification of water-Municipal supply – purification of drinkingwater–Calculation of pH, H^+ ions and TDS of different samples of acid and base–Quality of portable water (WHO Standard)		6

Ex.No	Name of the Exercise	
5	Calculation of pH, H^+ ion and TDS of different samples	
6	Estimation of copper by Complexometry	12
7	Effluent analys is of heavy metalions-lead, copper & zinc	
8	Systematic analysis of acid radicals such as carbonate, nitrate and sulphate ions.	
	Test & Assessment	9
TOTAL HOURS		**45**

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	(Non-Circuit Branches)	1	0	2	2

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

Reference

- XI and XII Standard Tamilnadu State Board Chemistry Text Book, 2023 edition, Textbook Corporation Tamil Nadu
- Essentials of Physical Chemistry, Bahl & Tuli, 28[th]edition, S.Chand Publishing House.
- A Textbook of Engineering Chemistry, Dr.Sunita Rattan, 2020 reprint, S.K.Kataria & Sons
- Textbook of Physical Chemistry, P. L Soni, O.P. Dharmarha & U.N. Dash, 2022 edition, S. Chand Publishing House.

Web-based/Online Resources

- https://libguides.lib.msu.edu/chemistry/teachonline
- https://www.khanacademy.org/science/chemistry
- https://phet.colorado.edu/
- https://www.sciencebysimulation.com/chemreax/Faq.aspx
- www.olabs.gov.in

Allocation of marks in End Semester Practical Examination and Model Practical Examination

- Practical observation notebook is sufficient and no need of separate practical record note book.
- Submission of Practical observation note book to model practical exam and end semester practical exam is mandatory.

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	**(Non-Circuit Branches)**	1	0	2	2

For Experiment No:1, 2, 3, 4 & 6

S.No	Description	Marks
1	Short Procedure	3
2	Titration I	20
3	Titration II	20
4	Calculation	10
5	Result	2
6	Viva Voce	5
	TOTAL MARKS	**60**

Skill Value

- Less than or equal to 2% with correct tabular column and details – 35 marks
- More than 2% - 15marks
- More than 4%-5 marks
- Wrong tabular column even if reading is correct–only 5 marks

For Experiment No:5

S.No	Description	Marks
1	Definition of pH and formula	3
2	Water quality parameters(any 3)	10
3	pH reading for 3 samples	10
4	Calculation of hydrogen ion concentration	10
5	TDS reading for 3 samples	10
6	Result	2
7	Viva Voce	5
	TOTAL MARKS	**60**

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	**(Non-Circuit Branches)**	**1**	**0**	**2**	**2**

For Experiment No:7 (Effluent Analysis)

S No	Description	Marks
1	Definition	3
2	Any three test for 3 effluents	20
3	Any five sources for each effluent	15
4	Any five harmful effects for each	15
5	Result	2
6	Viva Voce	5
	TOTAL MARKS	**60**

For Experiment No:8 (Analysis of Acid Radicals)

S No	Description	Marks
1	Systematic analysis of three acid radicals with five tests for each	30
2	Confirmatory test for each radical	20
3	Result	5
4	Viva Voce	5
	TOTAL MARKS	**60**

Allocation of Marks for CA1 & CA2 Practical Tests

For Experiment No: 1, 2, 3, 4 & 6

S No	Description	Marks
1	Short Procedure	3
2	Titration I	7
3	Titration II	7
4	Calculation	6
5	Result	2
6	Observation Note Book	5
	TOTAL MARKS	**30**

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	**(Non-Circuit Branches)**	**1**	**0**	**2**	**2**

- Less than or equal to 2% with correct tabular column and details - 15 marks
- Morethan2%-10marks
- Morethan4%-5 marks
- Wrongtabularcolumnnevenifreadingiscorrect–only5marks

For Experiment No:5

S No	Description	Marks
1	Definition of pH and formula	3
2	Water quality parameters(any 5)	7
3	pH reading and 3 samples	3
4	Calculation of hydrogen ion concentration	7
5	TDS reading for 3 samples	3
6	Result	2
7	Observation Note Book	5
TOTAL MARKS		**30**

For Experiment No:7 (Effluent Analysis)

S No	Description	Marks
1	Definition	3
2	Any three test for3 effluents	10
3	Any five sources for each effluent	5
4	Any five harmful effects for each	5
5	Result	2
6	Observation Note Book	5
TOTAL MARKS		**30**

BEH277	Applied Chemistry– I	L	T	P	C
Practicum	(Non-Circuit Branches)	1	0	2	2

For Experiment No:8 (Analysis of Acid Radicals)

S No	Description	Marks
1	Identification of three acid radicals with two tests for each	10
2	Confirmatory test for each radical	10
3	Result	5
4	Observation Note Book	5
TOTAL MARKS		**30**

Allocation of Marks for CA1 & CA2 Theory Tests

Part–A Theory	5 questions to be answered out of 7 questions	5x2 marks	10marks
Part–B Practical	2 questions to be answered out of 3 questions	2x5 marks	10marks
TOTAL			**20marks**

BEH276	**Applied Chemistry– II**	**L**	**T**	**P**	**C**
Practicum	**(Circuit Branches)**	**1**	**0**	**2**	**2**

Introduction

This course will give the outline and applications of some important chemistry principles which are relevant for circuit polytechnic branches.

Course Objectives

The objective of this course is to

- Analyze soft and hard water, EDTA titrations on hardness of water and boiler scale formation.
- To empower the leaner with the fundamental knowledge on components of battery and working.
- To understand the process of electroplating and appreciate the role of electroplating in daily life.
- To build understanding on methods of softening hard water- Ion exchange and reverse osmosis method and drinking water quality parameters (WHO).

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Compare the hardness of water samples in different regions

CO2: Identify and apply the methods for effective conversion of hard water into soft water

CO3: Understand the fundamental concepts of cells and batteries as well as construction and working of cells

CO4: Construct the electroplating model and apply the concept in daily life situations

Pre-requisites

10th Standard Chemistry

BEH276	Applied Chemistry– II	L	T	P	C
Practicum	(Circuit Branches)	1	0	2	2

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	1	1	3
CO2	3	3	2	1	1	1	3
CO3	3	2	2	2	1	1	3
CO4	3	3	2	1	1	1	3

Legend:3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome- and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

BEH276	Applied Chemistry– II	L	T	P	C
Practicum	(Circuit Branches)	1	0	2	2

Assessment Methodology

	Continuous Assessment (40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Practicum Exam	Practicum Exam	Model Exam	Practicum Exam
Duration	2 hour		2 hour 30 minutes	2 hour 30 minutes
Exam Marks	50 (Theory-20+Practical-30)	50 (Theory-20+Practical-30)	60	60
Converted to	20	20	20	60
Marks	Best one of CA1 and CA2 (20 marks)		20	60

Note:

- Best one of CA1 and CA2 should be considered for the internal assessment of 20 marks
- CA 3 Model examination should be conducted as per the End Semester guidelines. The same should be considered for the internal assessment of 20 marks

BEH276	Applied Chemistry– II	L	T	P	C
Practicum	(Circuit Branches)	1	0	2	2

Unit I	WATER ANALYSIS AND TREATMENT	
Sources of water – depletion of underground water – Reasons - Hard water and soft water – Hardness of water – Carbonate and Non– carbonate hardness – Methods of expressing hardness – mg/lit and ppm – Estimation of total hardness by EDTA method –simple Problems on total hardness only -- identification of sulphate and chloride ions- identification of heavy metal ions in the given sample of effluent- Softening of hard water–Ion-Exchange method and Reverse Osmosis-Calculation of pH, H^+ ion and TDS of different samples		6

Ex.No	Name of the Exercise	
1	Estimation of total hardness of water by EDTA method	
2	Determination of alkalinity of sample of hard water	12
3	Estimation of residual chlorine in a given water sample	
4	Estimation of copper by Complexometry	

Unit II	BATTERIES AND CELLS	
Metallic and electrolytic conduction – differences - Faradays laws of electrolysis-electronic concept of oxidation and reduction – electroplating - definition-examples-chrome plating, copper plating and galvanization-Energy sources – Primary and secondary battery- electrochemical cell–construction and working of dry cell– lead acid battery-advantages construction and working of solar cell.		6

Ex. No	Name of the Exercise	
5	Calculation of pH, H^+ ion and TDS of different samples	
6	Effluent analysis of heavy metal ions-lead, copper & zinc	12
7	Process of electroplating/ copper plating using Copper Volta meter	
8	Systematic analysis of acid radicals such as carbonate, nitrate and sulphate ions.	
Test & Revision		**9**
TOTAL HOURS		**45**

BEH276	Applied Chemistry– II	L	T	P	C
Practicum	(Circuit Branches)	1	0	2	2

Suggested List of Students Activities

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Presentation/Seminars by students on any recent technological developments based on the course
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

References

1. XIth and XIIth standard Tamilnadu Chemistry Text Book, 2023 edition, Textbook Corporation Tamil Nadu
2. EssentialsofPhysicalChemistry,Bahl&Tuli,28thedition,S.Chand Publishing House.
3. A textbook of Engineering Chemistry, Dr.Sunita Rattan, 2020 reprint, S.K.Kataria & Sons
4. Textbook of Physical Chemistry, P.L Soni, O.P.Dharmarha & U.N. Dash, 2022 edition, S.Chand Publishing House.

Web-based/Online Resources

1. https://libguides.lib.msu.edu/chemistry/teachonline
2. https://www.khanacademy.org/science/chemistry
3. https://phet.colorado.edu/
4. https://www.sciencebysimulation.com/chemreax/Faq.aspx
5. www.olabs.gov.in

Allocation of marks in End semester practical exam and Model exam

- Practical observation note book is sufficient and no need of separate practical record note book. Submission of Practical observation note book to model practical exam and end semester practical exam is mandatory.

BEH276	Applied Chemistry– II	L	T	P	C
Practicum	(Circuit Branches)	1	0	2	2

For Experiment No:1, 2, 3 & 4

S No	Description	Marks
1	Short Procedure	3
2	Titration I	20
3	Titration II	20
4	Calculation	10
5	Result	2
6	Viva Voce	5
	TOTAL MARKS	**60**

Skill Value

- Less than or equal to 2% with correct tabular column and details - 35 marks
- More than 2%-15 marks
- More than 4%-5 marks
- Wrong tabular column even if reading is correct – only 5 marks

For Experiment No:5

S No	Description	Marks
1	Definition of pH and formula	3
2	Water quality parameters(any5)	10
3	pH reading and 3 samples	10
4	Calculation of hydrogen ion concentration	10
5	TDS reading for 3 samples	10
6	Result	2
7	Viva Voce	5
	TOTAL MARKS	**60**

BEH276	Applied Chemistry–II	L	T	P	C
Practicum	**(Circuit Branches)**	1	0	2	2

For Experiment No:6(Effluent Analysis)

S No	Description	Marks
1	Definition	3
2	Any Three test for 3 effluents	20
3	Any Five sources for each effluent	15
4	Any Five harmful effects for each	15
5	Result	2
6	Viva Voce	5
TOTAL MARKS		**60**

For Experiment No:7 for Circuit Branches (Electroplating)

S No	Description	Marks
1	Electroplating-definition of chrome plating, copper plating and galvanization	6
2	Apparatus required	2
3	Anode cathode and electrolyte	15
4	Circuit diagram	10
5	Cell reaction at anode	10
6	Cell reaction at cathode	10
7	Result	2
8	Viva Voce	5
TOTAL MARKS		**60**

For Experiment No:8(Analysis of Acid Radicals)

S No	Description	Marks
1	Systematic analysis of two acid radicals with tests for each	30
2	Confirmatory test for each radical	20
3	Result	5
4	Viva Voce	5
TOTAL MARKS		**60**

BEH276	Applied Chemistry–II	L	T	P	C
Practicum	(Circuit Branches)	1	0	2	2

Allocation of Marks for CA1 & CA2 Practical Tests

For Experiment No: 1, 2, 3 & 4

S No	Description	Marks
1	Short Procedure	3
2	Titration I	7
3	Titration II	7
4	Calculation	6
5	Result	2
6	Observation Note Book	5
TOTAL MARKS		**30**

- Less than or equal to 2% with correct tabular column and details - 15 marks
- More than 2%-10marks
- More than 4%-5 marks
- Wrong tabular column even if reading is correct–only 5 marks

For Experiment No:5

S No	Description	Marks
1	Definition of pH and formula	3
2	Water quality parameters (any 3)	7
3	pH reading and 3 samples	3
4	Calculation of hydrogen ion concentration	7
5	TDS reading for 3 samples	3
6	Result	2
7	Observation Note Book	5
TOTAL MARKS		**30**

For Experiment No:6(Effluent Analysis)

S No	Description	Marks
1	Definition	3
2	Any three test for 3 effluents	10
3	Any five sources for each effluent	5

BEH276	**Applied Chemistry–II**	**L**	**T**	**P**	**C**
Practicum	**(Circuit Branches)**	**1**	**0**	**2**	**2**

4	Any five harmful effects for each	5
5	Result	2
6	Observation Note Book	5
TOTAL MARKS		**30**

For Experiment No:7 for Circuit Branches (Electroplating)

S No	Description	Marks
1	Electroplating-definition of chromplating, copper plating and galvanization	3
2	Apparatus required	-
3	Anode cathode and electrolyte	5
4	Circuit diagram	5
5	Cell reaction at anode	5
6	Cell reaction at cathode	5
7	Result	2
8	Observation Note Book	5
TOTAL MARKS		**30**

For Experiment No:8 (Analysis of Acid Radicals)

S No	Description	Marks
1	Identification of three acid radicals with two tests for each	10
2	Confirmatory test for each radical	10
3	Result	5
4	Observation Note Book	5
TOTAL MARKS		**60**

Allocation of Marks for CA1 & CA2 Theory Tests

Part–A Theory	5 questions to be answered out of 7 questions	5x2 marks	10marks
Part–B Practical	2 questions to be answered out of 3 questions	2x5 marks	10marks
TOTAL			**20marks**

BEH278	BASIC ENGINEERING PRACTICES	L	T	P	C
Practical		0	0	4	2

Introduction

It has been realized that Tamil Nadu would become a prosperous and a modern state by rising skill levels. It is very much important for fresh technicians to be highly skilled in dealing with the modern technologies in the Mechanical, Electrical, Plumbing and Safety & Security system works of buildings ince the building systems have become more integrated. Besides, having the onsite experience is valid to build up quality craftsmanship.By understanding the huge demand of the skilled technicians in the basic engineering practices. This course equips participants with the knowledge and skills needed to install water and drainage supply systems, perform maintenance of water pumps, guarantee water quality, Low Voltage power supply installation, and safety & security systems.

Course Objectives

The objective of this course is to prepare the student,

- To understand the work area and piping material sand tools for plumbing and water management.
- To install the water supply system, drainage system, pipes, sanitary fixtures and conduit pipe fittings.
- To install and maintain a water pump and to operate and maintain water treatment units.
- To perform the basic installation of electrical fixtures in Low Voltage connection.
- To learn the installation of the basic security and basic safety systems.
- To demonstrate and operate the fire fighting extinguisher and fire fighting systems.
- To know the importance of Personal Protective Equipments.

Course Outcomes

On successful completion of this course, the student will be able to,

CO1: Execute the installation of assembled pipes, fittings, and other components of water supply and

drainage systems.

CO2: Establish the water pump and water purifier to perform related equipment maintenance.

CO3: Affix electrical fixtures and implement Lightning Arrester and Earthing Systems for Low

Voltage System.

CO4: Install the security system.

CO5: Demonstrate the fire fighting extinguisher and fire safety system.

Pre-requisites

NIL

BEH278	BASIC ENGINEERING PRACTICES	L	T	P	C
Practical		0	0	4	2

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	-	-	-
CO2	3	3	2	1	-	-	-
CO3	3	3	2	1	-	-	-
CO4	3	3	2	1	-	-	1
CO5	3	3	2	1	-	-	1

Legend:3-High Correlation, 2-Medium Correlation,1-Low Correlation

BEH278	BASIC ENGINEERING PRACTICES	L	T	P	C
Practical		0	0	4	2

Instructional Strategy

- It is advised that teacher stake steps to pique pupils' attention and boost their curiosity to learn.
- Implement task-based learning activities where students work on specific tasks or projects.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Incorporate formative and summative assessments to gauge student progress and provide targeted feedback.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability based.
- All demonstrations/Hand-on practices may be followed in the real environment as far as possible.

Assessment Methodology

	Continuous Assessment(40marks)				End Semester Examination (60marks)
	CA1	CA2	CA3	CA4	
Mode	Practical (Exercises 1,3,4,6and8)	Activity Report (4 Nos. as below)	Model Practical (All Exercises)	Record of work done	Practical Examination
Duration	2 Hours	2 Hours	2 Hours 30 Minutes	Every Exercise	2 Hours 30 Minutes
Exam Marks	80	40	60	100	60
Converted to	10	10	10	10	60
Marks	40				60

BEH278	BASIC ENGINEERING PRACTICES	L	T	P	C
Practical		0	0	4	2

Note:

CA1: It shall be conducted as per the end semester question pattern for 80 Marks (without written test). It should be conducted after completion of the mentioned exercises in the 7thweek. The 80 marks will be converted to 10 Marks and considered for the Internal Assessment.

CA2: All the students should prepare and submit a report about the four activities mentioned below. The same have to be evaluated for 10 marks each. The average of 10 Marks will be considered for the Internal Assessment.

CA 3: After completion of all the exercises, model examination shall be conducted as per end semester question pattern. The mark should be converted to 10 Marks for the internal assessment. It should be conducted after completion of all the exercises in the 16th week.

CA 4: Record of work done should be maintained and the same have to be evaluated after completion of each exercise before the commencement of the next exercise for 10 Marks. The average of all the exercise marks should be converted to 10 Marks for the internal assessment.

BEH278	BASIC ENGINEERING PRACTICES	L	T	P	C
Practical		0	0	4	2

Exercise 1	Installation and operation of water supply systems. ● Prepare the layout of the water supply system and bill of quantity. ● Demonstrate the process of cutting, bending and assembling various types of water supply pipes. ● Perform the installation of the assembly of pipes, valves, fittings and other water supply components. ● Perform post-installation activities.	3
Water Supply System	Scope of plumbing work - Plumbers common hand tools -About different types of pipes -Differences Between PVC, CPVC, UPVC Pipe. -About differentTypesofPipeFittings:-Socket,Elbow,Tee,Union,Bend,Cap,Plug, Cross, Ferrule etc. - Plumbing Symbols and Code for Tools & Materials on water line. Description of pipe fittings. Methods of joining and their uses. Precautions to be taken while fixing. Description of cocks & valves-their types-inspection and testing of water supply systems-methods of testing pipelines-smoke test-pressure hydraulic test. Water supply system of a small town.	2
Exercise 2	Installation and operation of drainage systems. ● Prepare the layout of the water supply system and bill of quantity. ● Demonstrate the cutting, bending and assembling of various types of drainage pipes. ● Perform installation of drainage systems. ● Perform the various post-installation activities.	3

Sanitary and Sewer System	Layout of drainage system - preparation of bill of quantity - installation of sanitary fittings - pipe alignment and slope - above ground - below ground- prevention of water hammer - plumbing and sanitary symbols and plumbing codes – cutting – threading - plumbing and sanitary fixtures - tap or faucet – shower – washbasin - water closets - flushing cistern – urinals	2
Exercise 3	Carryout associate masonry work pertaining to pipeline works. ● Casting of pole stands. ● Identify the materials and bonds for brickwork and masonry and their repair. ● Laying of bricks. ● Plaster masonry on internal & external surface.	3
Masonry Work	Purpose of the masonry construction – trench - pipe support work - man hole etc. – Material Used in Brick Masonry - Brick- Mortar - Tools Required for Brick masonry-General Principles in the Construction of Brick Masonry-Method of Laying Bricks in the Wall-Maintenance of Brick Masonry-Plastering and its Importance - Purposes of Plastering - Tools Used in Plastering Work – Material required for plastering-Types of plaster-Steps to be followed in Cement plastering.	2
Exercise 4	Operation and maintenance of water pump systems. ● Identify the type. ● Install water pump and related equipment. ● Check the installation of the pump. ● Perform electrical connection of pumps. Perform maintenance of water pump systems.	3
Water Pump	Types of pumps Airlift Deep Well Pumps-Centrifugal Pump-Reciprocating Pump-Jet Well Pumps-Rotary Pumps-Contamination of water in a well.	2

Exercise 5	Install the Water Purifier. ● Preparing to mount the purifier ● Mount the filter and drain the inlet line before connecting it to the water purifier. ● Align the filter is as per instructions in the installation manual. ● Run the purifier and ensure there are no leak sat any point. ● Identify the Fault Replace the Dysfunctional Part in the Water Purifier Unit	3
Water Treatment	Source of water-drinking water-soft water-hard water-Water Treatment Methods - Contaminants of Water - Impurities of water – organic and inorganic impurities. Water Treatment Agents - Water Purifiers - Types of water purifiers- Reverse Osmosis (RO) water purifiers - Ultra Filter water purifiers-Ultraviolet(UV) Water Purifiers-Gravity Based water purifiers-Activated Carbon water purifiers.	2
Exercise 6	Perform basic installation of electrical power supply in domestic houses. ● Discuss about the main board layout wiring. ● Identify the power load and lighting load details. ● Understand the different types of electrical fixtures, fittings used at specified locations. ● Enlist different types of faults in lighting arrangement. ● Enlist the methods to perform quality check and testing of the fixtures.	3
Electrical Supply	Identifying and Selecting the Wiring Material and components-Conducting Material-InsulatingMaterial-WiringAccessories-NeedofCircuitBreaker-Overload - Short Circuit - Ground Fault - Types of Over current Protective Devices-Fuse-Types of Fuses-Types of breaker-ELCB-RCB-MCB-Types of Cables. ICTP Switch and Distribution Board-Importance of energy meter - Basic Types of Energy Meters - Types of Meters - Single-phase Meter -	2

	Three-phase Whole Current Meter (Polyphase Meter) - HT Meter (Trivector Meter) - Smart Meter.	
Exercise 7	Installation and Operation of Earthing System and Installation of Lightning Preventer. ● Earth fault protection in LV installations. ● Types of Earth electrodes and Erection. ● Install any one type earthing ● Technical aspects of Lightning, Character is tic of Lightning. ● Install any one type of Lightning arrester.	2
Earthing and Lightning	Requirement of Earthing –Importance of Earthing and its Types -Types of Earthing -Pipe Earthing- Plate Earthing-Advantages of Earthing-Earthpit-Earth Tester-testing of earthpit. Atmospheric Lightning-Lightning Arrester -Working of Lightning Arrester.	2
Exercise 8	Installation and operation of CCTV System. ● Types of Camera. ● Install and configure CCTV Camera. ● Network Video Recorder installation. ● Monitor and Display installation and configuration.	3
CCTV Systems	Introduction and uses-Elements of a basic CCTV system-Camera,monitor and digital recorder.-Camera types and uses:-Fixed dome &PTZ and Bullet, indoor and outdoor, monochrome, day and night. Camera specifications: -Sensitivity, signal to noise ratio and resolution-Network Devices-Switches, Routers-Trouble shooting and maintenance-Installation and Testing commissioning.	2

Exercise 9	Installation of Smoke and Gas Detector Alarm/Fire alarm system ● Detecting smoke and inflammable gas. ● Detects the concentration of smoke/gas level in the atmosphere and outputs a voltage signal accordingly. ● The buzzer will be buzzing to notify the user about the rise of the smoke/gas level.	2
IOT/Fire alarm	Smoke Detector using Arduino and Smoke Sensor -Components Used in smoke detector Project-Arduino UNO development board – 16 × 2 LCD-Smoke Sensor-Bread board-Connecting wires - Fire alarm - Installation procedure.	2
Exercise 10	Installation and operation of the fire fighting system. ● Selection and installation of fire extinguishers. ● Inspection and maintenance of fire extinguishers. ● Operation procedure of fire extinguishers. ● Maintenance checklist/schedule for hose reel fire fighting system.	3
Fire Safety	Procedure For Clearance From Fire Service - Fire Protection Requirements – Extinguishing System - Fire Alarm System - Hose Reels - Sprinkler Installation. Types of Extinguisher- Water, Foam, Powder, Carbon Dioxide, Wet Chemical-How to Use an Extinguisher – Care and Maintenance of Fire Control Equipments - Periodic service and maintenance procedures. – number and size of fire extinguishers-selection of location – general safety precautions for maintenance - refilling schedule for fire extinguishers and schedule for operational test on fire extinguishers - schedule for hydraulic Pressure testing of fire extinguishers.	2

BEH278	BASIC ENGINEERING PRACTICES	L	T	P	C
Practical		0	0	4	2

Suggested list of students activity

- Study the existing water supply system and drainage system and prepare the report. Study the existing water treatment plant and prepare the report.

- Study the existing CCTV system and prepare the report. Study the existing fire fighting system and prepare the report.

Reference:

- NCERT Plumber, NCERT Electrician, NCERT Field technician
- Multi Skill Technician(Electrical)QPCode:ELE/Q3115.
- IoT Based Smart Home Automation and Energy Management.
- Multi Skill Technician(Electrical)ELE/Q3109v1.0.
- Jal Vitaran Sanchaalak(WaterDistributionOperator)(Multi-Skill)PSC/Q0122.
- CCTV Camera Equipment Installation, Service &Maintenance.
- Design, Installation, Operation and Maintenance Manual.
- Selection,InstallationandMaintenanceofFirst-AidFireExtinguishers—CodeofPractice (Third Revision)
- An Introduction to Closed Circuit Television (CCTV)Systems.

Web-based/Online Resources

- Major Water Supply Schemes| TWAD(tn.gov.in)

- Deposit Works | TWAD (tn.gov.in)

- Rural Water Supply Schemes | TWAD (tn.gov.in)

- Urban Water Supply Schemes | TWAD (tn.gov.in)

- Under Ground Sewerage Schemes|TWAD(tn.gov.in)

https://youtu.be/OTI9iSGIObU

 https://youtu.be/FBu_DU-hK04

 https://youtu.be/xNrZ1uZS8uU

https://youtu.be/Hyjr44BcazA

https://youtu.be/JAiwJP7l3ko

https://youtu.be/kDg-0DbVsxQ

 https://youtu.be/2bCLDM74F2k

https://youtu.be/obkUNBH1xnY

https://youtu.be/USajjGYjUH4

https://youtu.be/UrWgV1F7JFs

 https://youtu.be/Y8duhoCdDz4

https://youtu.be/GUmI_IH9cAc

https://youtu.be/JWXh-WwqlwI

BEH278	BASIC ENGINEERING PRACTICES	L	T	P	C
Practical		0	0	4	2

Additional Instructions

For the record of work done, a note book or printed manual may be used. In this, the student should draw a diagram, and mention the readings/observations, calculations and result manually. The same has to be submitted for the end-semester examination on the first attempt.

The proper safety procedure and norms should be followed with proper uniform (Khaki pants & half-hand shirt) with safety shoes during the practices.

All the Exercise should be completed, One Exercise should be given by lot or question paper received from DOTE should be followed for the end semester Examination.

Allocation of Marks for End Semester Examinations.

Part	Description	Marks
A	Procedure	10
B	List of Tools/Equipments	5
C	Observation/Installation/Report	10
D	Finish/Completion	10
E	Written test (MCQ question)*	20
F	Viva voce	5
	Total	**60**

*Written test (MCQ)

Twenty one mark MCQ questions shall be asked from the theory portions. Each exercise two questions shall be prepared.

BEH278	DRAFTING PRACTICES	L	T	P	C
PRACTICAL		0	0	4	2

Introduction

Engineering drawing is the language of engineers. By means of drawing, the shape, size, finish, colour, and construction of any object can be described accurately and clearly. Hence, drawing is a way for communicating engineer's ideas, designs, and thoughts to others. It is necessary for the engineers to develop their skill in preparing engineering drawings. This subject is planned to include sufficient practices which would help the student in visualization of two dimensional objects and developing the drawing skills. Nowadays, Computer Aided Drafting (CAD)practices are used invariably in all the industries to create drawings easily and quickly. Hence this subject is aimed to acquire basic knowledge in manual drafting as well as in CAD. The chapters are arranged in sequence and starts from the basic concepts of lettering, dimensioning, geometrical constructions, construction of polygon and department specific drawings.

Course Objectives

The objective of this course is to enable the student to
- List the usage of various drawing instruments.
- Understand the basics of lettering and dimensioning of drawings.
- Acquire the ability to draw the basic geometrical constructions.
- Understand the basics of CAD.
- Use CAD in designing and developing department specific drawings.

Course Outcomes (CO)

On successful completion of this course, the student will be able to
CO1 : Utilize various drawing instruments to create manual drawing.
CO2 : Construct the drawings as per BIS
CO3 : Build the basic geometrical constructions
CO4 : Create department specific drawings using various commands in CAD.

Pre-requisites: NIL

BEH278	DRAFTING PRACTICES	L	T	P	C
PRACTICAL		**0**	**0**	**4**	**2**

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	-	-	-	-
CO2	2	3	2	-	-	-	-
CO3	2	1	3	-	-	-	-
CO4	-	-	-	3	-	-	-
CO5	-	-	-	-	-	-	-

Instructional Strategy

✦**Engage and Motivate:** Instructors should actively engage students to boost their learning confidence.

✦**Real-World Relevance:** Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.

✦**Interactive Learning:** Utilize demonstrations and plan interactive student activities for an engaging learning experience.

✦**Application-Based Learning:** Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.

✦**Simulation and Real-World Practice:** Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.

✦**Encourage Critical Analysis:** Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

BEH278	DRAFTING PRACTICES	L	T	P	C
PRACTICAL		0	0	4	2

Assessment Methodology

	Continuous Assessment Test (40marks)				End Semester Examination (60marks)
	CA1	CA2	CA3	CA4	
Mode	Manual Drafting (Unit I & II)	CAD (Unit-III)	Model Exam	Practices and Record of Work done	Practical Examination
Duration	2hours	2hours	2 Hours 30 Minutes	---	2 Hours 30 Minutes
Exam Marks	60	60	60	100	60
Converted to	10	10	10	10	60
Marks	**40**				**60**

Note

1) CAT 1 : Three questions should be given from Unit – I & II to draw in the drawing sheet and the same should be evaluated for 60 Marks. Each question carries 20 Marks.

2) CAT 2 : Three questions should be given from Unit – III to draw in the CAD and the same should be evaluated for 60 Marks. Each question carries 20 Marks.

3) CAT 3 : Model Examination for 60 Marks.

4) CAT 4 : All exercises [4 Drawing sheets (each 5 marks) + 8 CAD Drawings (each 10 marks)]. The same should be submitted for the board examination as a record of work done.

BEH278	DRAFTING PRACTICES	L	T	P	C
PRACTICAL		0	0	4	2

PART – A : MANUAL DRAFTING

[Note : The drawings (Ex.Nos.1 – 4) should be drawn in drawing sheets and the same should be submitted for evaluation]

Unit-I	BASICS OF DRAWING AND DIMENSIONING	
Importance of engineering drawing - drawing practice as per BIS code - drawing Instruments: drawing board, mini drafter, drawing sheets, drawing pencils, set squares, etc. **Lettering and numbering** as per BIS - single stroke letters - uppercase and lowercase Letters and numbering. **Dimensioning** – need for dimensioning - terms and notations as per BIS - parallel, chain and progressive dimensioning - important dimensioning rules.		4
Ex.No.1. (a) Rewrite the given statement in a single stroke vertical uppercase letters (5 statements) (b) Rewrite the given statement in a single stroke vertical lowercase letters (5 statements)		4
Ex.No.2. Redraw the given drawing and dimension it as per BIS. (Fig.1 – Fig.4)		6
Unit-II	GEOMETRIC CONSTRUCTION AND CONSTRUCTION OF POLYGONS	
Geometric Constructions: Bisect a straight line, an arc and an angle – divide a straight line and circle into a number of equal divisions – construct an arc touching two straight lines at any angle – construct an arc touching two arcs. **Construction of Polygons:** Triangle, square, rectangle, pentagon and hexagon – various positions – side of the polygon is parallel, perpendicular and inclined to principal planes.		4
Ex.No.3. (a) Divide a straight line and circle into given number of equal divisions (b) Construct an arc touching two straight lines (c) Construct an arc touching two arcs		4
Ex.No.4. Construct the polygon of given size (Choose any suitable method) (Triangle, Rectangle, Square, Pentagon and Hexagon)		4

PART - B : COMPUTER AIDED DRAFTING	
[Note : The drawings (Fig.1 - Fig.8) should be created using CAD Software and the printout should be submitted for evaluation]	

Unit-III	BASICS OF COMPUTER AIDED DRAFTING (CAD)	
Introduction to CAD – applications – advantages of CAD over manual drafting – understanding user interface – types of coordinate systems - absolute, relative, polar – drafting settings – Limits – Units – Creating objects using draw commands – Line, Arc, Circle, Rectangle, Ellipse, Polygon, Point, Pline, Xline, Sketch – Creating text – Dtext, Mtext, Text styles – Mline, spline – Drawing with precision – Osnap options – drawing aids – Fill, Snap, Grid, Ortho lines – Function keys – Editing and modify commands – Object selection methods – Erasing object – Oops – Canceling and undoing a command – Copy – Move –Array – Offset – Scale – Rotate – Mirror – Break – Trim - Fillet- Chamfer– Extend – Explode – Divide – Measure – Stretch – Lengthen – Changing properties – Color, Line types, LT scale –Matching properties – Editing with grips – Pedit – Ddedit – Mledit. Basic dimensioning – Editing dimensions – Dimension styles – Adding leaders – Creation of blocks – Wblock – Inserting a block – Block attributes – Hatching – Pattern types – Boundary hatch – Working with layers – View group commands – Zoom, redraw, regen, pan– Enquiry tools. Page setup in layout – Viewports – Plotting drawings.		8
Ex.No.5. Draw the given drawing and dimension it as per BIS using CAD (Fig.1 – Fig.4)	6

FOR MECHANICAL ENGINEERING AND ALLIED COURSES ONLY

**GARMENT TECHNOLOGY

Unit-IV	ORTHOGRAPHIC VIEWS USING CAD	
Orthographic projections – planes of projection – principal orthographic views – first angle projection – third angle projection – Construction of orthographic views of simple components using CAD.		4
Ex.No.6. Draw the orthographic views of the given component using CAD (Fig.5 – Fig.8)	8

FOR CIVIL ENGINEERING AND ALLIED COURSES ONLY

Unit-IV	BASIC CIVIL ENGINEERING DRAWINGS USING CAD	
Important terminologies used in Civil Engineering Drawing – Basic conventional symbols – materials, doors, windows, stairs, walls, sanitary fittings, etc. – Basic civil engineering drawing using CAD.		4

Ex.No.6. Draw the given civil engineering drawing using CAD (Fig.5 – Fig.8) (a) Cross sectional view of L -section, T-section, Channel and I - Section (b) Plan, Elevation and Sectional view of a Single storey, Single room consisting of RCC Flat Roof, Masonry walls, Lintel cum Sunshade, Door and windows of standard size. (c) Floor plan of a 2BHK residential building. (d) Plan and Sectional Elevation of a RCC Column with square isolated footings.	8

FOR EEE AND ALLIED COURSES ONLY

Unit-IV	BASIC ELECTRICAL WIRING CIRCUITS USING CAD
Basic electrical symbols - fuse, main switch, electrical bell, earth, SPST, DPST, TPST, Neutral link, ammeter, voltmeter, wattmeter, energy meter, frequency meter, power factor meter, timer, buzzer, MCB, etc. – Drawing of basic electrical circuits diagrams using CAD.	4
Ex.No.6. Draw the given electric circuit diagram using CAD. (Fig.5 – Fig.8) (a) Stair-case wiring electric circuit (b) Control and main circuit of automatic star delta starter (c) Control circuit for jogging in cage induction motor (d) Single phase wiring circuit	8

FOR ECE, COMPUTER ENGINEERING AND ALLIED COURSES ONLY

Unit-IV	BASIC ELECTRONICS CIRCUITS USING CAD
Basic electronics symbols - Resistor, Capacitor, Inductor, PN Junction Diode, Zener Diode, BJT, JFET, MOSFET, GND and VCC, Transformer, Switch, Buzzer, Battery, etc. Drawing of basic electronics circuits diagram using CAD.	4
Ex.No.6. Draw the given electronics circuit diagram using CAD. (Fig.5 – Fig.8) (a) Half Wave Rectifier circuit (b) Bridge Rectifier circuit (c) Common Emitter Amplifier circuit (d) Fire Alarm circuit	8

Continuous Assessment Test & Revision	8
Total Periods	**60**

Note: Suitable drawings should be provided to students for Ex.Nos.2, 5 & 6

BEH278	DRAFTING PRACTICES	L	T	P	C
PRACTICAL		0	0	4	2

Suggested List of Students Activity:

✦Download and learn the BIS Codes for various engineering practices.

✦Prepare 3D modesl of drawings with the help of cardboard to visualize and understand the

orthographic views.

✦Presentation/Seminars by students on any recent technological developments based on the

course

✦Periodic class quizzes conducted on a weekly/fortnightly based on the course

✦Mini project that shall be an extension of any practical lab exercise to real-world application

Text Books:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53 Edition, 2019.

2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.

3. T. Jayapoovan, "Engineering Drawing & Graphics Using Autocad", Vikas Publishing House Pvt.Ltd.

4. M. Yogesh, B. S. Nagaraja, N. Nandan, "Ccomputer Aided Electrical Drawing", PHI Learning Pvt.Ltd.

5. Thomas Tumilty, "Auto CAD for Electronics", PHI Learning Pvt. Ltd.

Reference:

1. Basant Agrawal, Agrawal C M "Engineering Drawing", McGraw hill HED

2. Venugopal.K, Prabhu Raja V, "Engineering Graphics", New Age International Publishers.

3. Mark Dix, Paul Riley, "Fundamentals of AutoCAD" PHI Learning Pvt. Ltd.

4. BL Theraja, AK Theraja, "A Textbook of Electrical Technology", S. Chand & Company Ltd.

5. D Chattopadhyay, PC Rakshit, "Fundamentals of Electric Circuit Theory", S. Chand & CompanyLtd.

6. R. S. Sedha, "A Textbook of Electronic Circuits", S. Chand & Company Ltd.

Web-based / Online Resources:

✦https://www.autodesk.in/campaigns/autocad-tutorials

✦https://www.mycadsite.com/tutorials.html

BEH278	DRAFTING PRACTICES	L	T	P	C
PRACTICAL		0	0	4	2

Allocation of Marks

Description	Marks
Part-A: Short Answer Questions	
15 One mark Questions from Unit–I, II & III (15x1= 15Marks)	15
Part-B: Computer Aided Drafting	
1)Drawing & Dimensioning using CAD from Unit–III Any **one** drawing out of four drawings (1 x15 =15Marks)	15
2)Department specific drawing using CAD from Unit –IV Any **one** drawing out of four drawings (1 x25=25Marks)	25
Viva–voce	5
Total Marks	**60**

DRAWINGS FOR LAB EXERCISES

COMMON FOR ALL BRANCHES   *(All dimensions are in mm)*
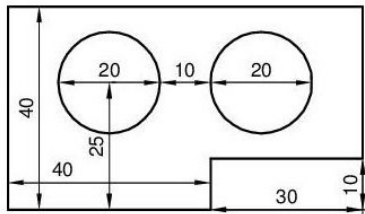
Fig.1
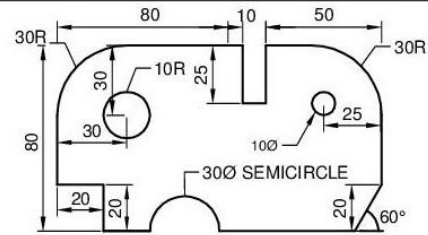
Fig.2
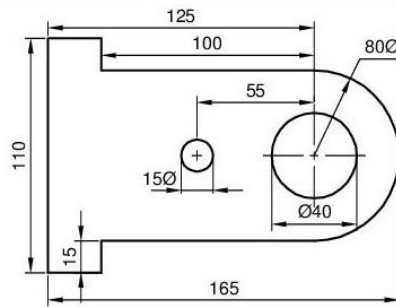
Fig.3
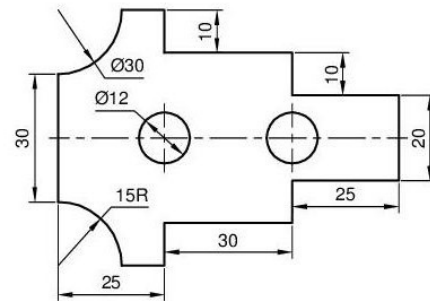
Fig.4

FOR MECHANICAL ENGINEERING AND ALLIED COURSES ONLY
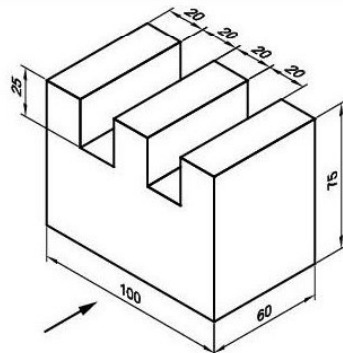
Fig.5
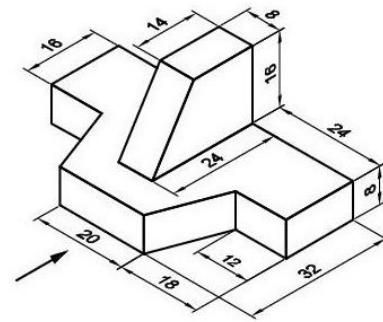
Fig.6
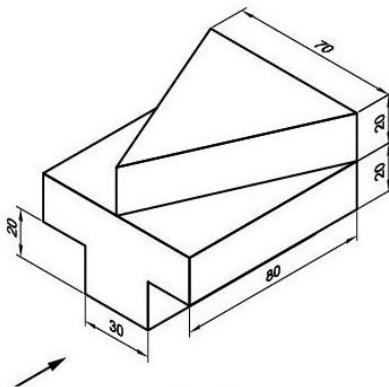
Fig.7
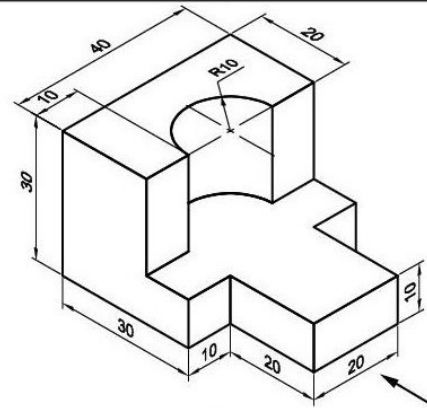
Fig.8
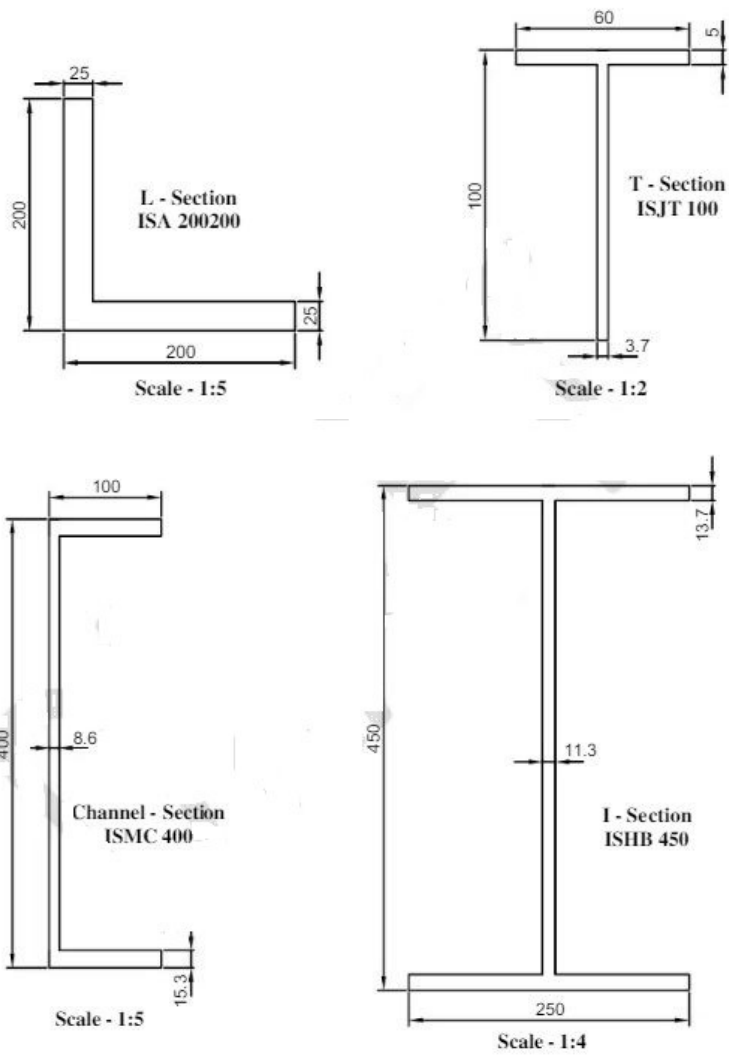
Fig.5. Cross sectional view of L -section, T-section, Channel section and I- Section
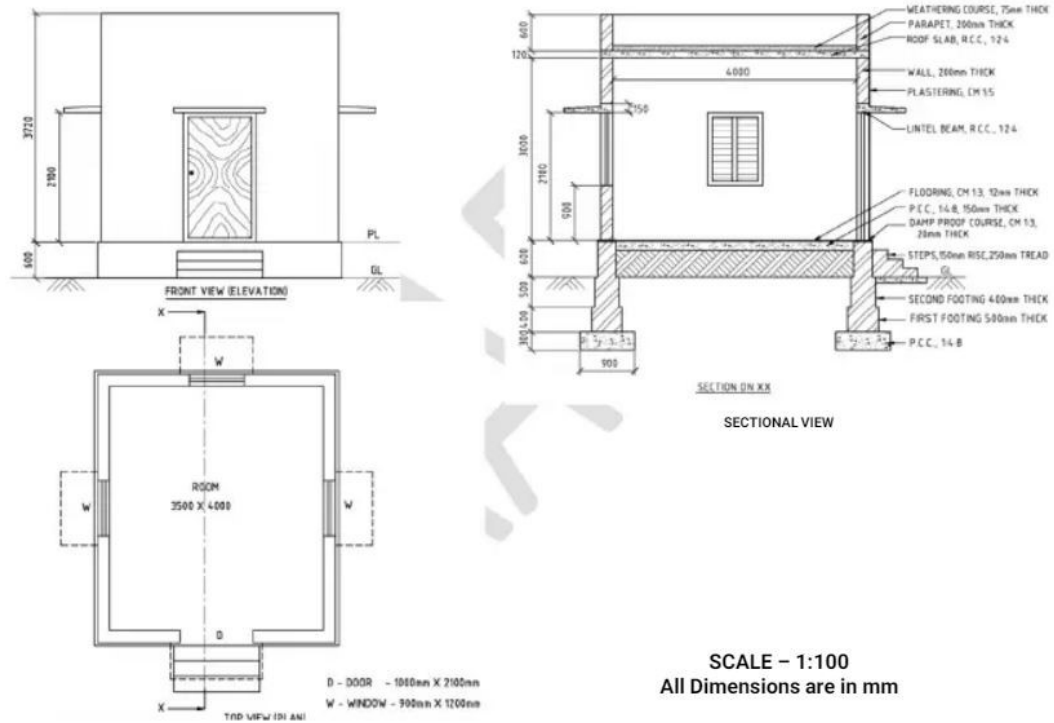
Fig.6. Plan, Elevation and Sectional view of a single storey building with single room
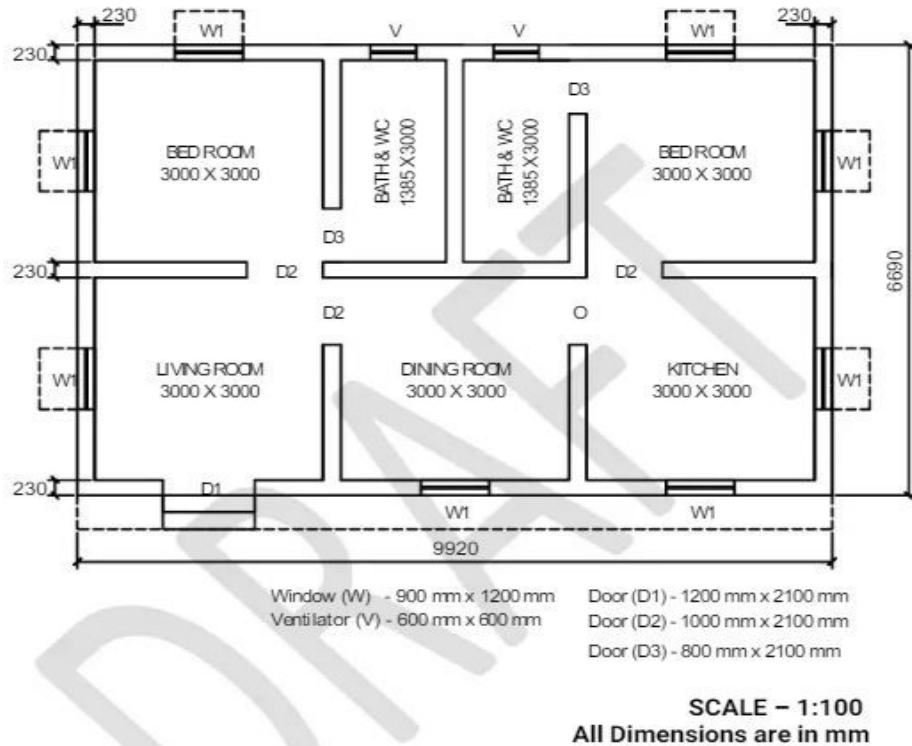

Window (W) - 900 mm x 1200 mm   Door (D1) - 1200 mm x 2100 mm
Ventilator (V) - 600 mm x 600 mm   Door (D2) - 1000 mm x 2100 mm
   Door (D3) - 800 mm x 2100 mm

SCALE – 1:100
All Dimensions are in mm

Fig.7. Floor plan of 2 BHK residential building
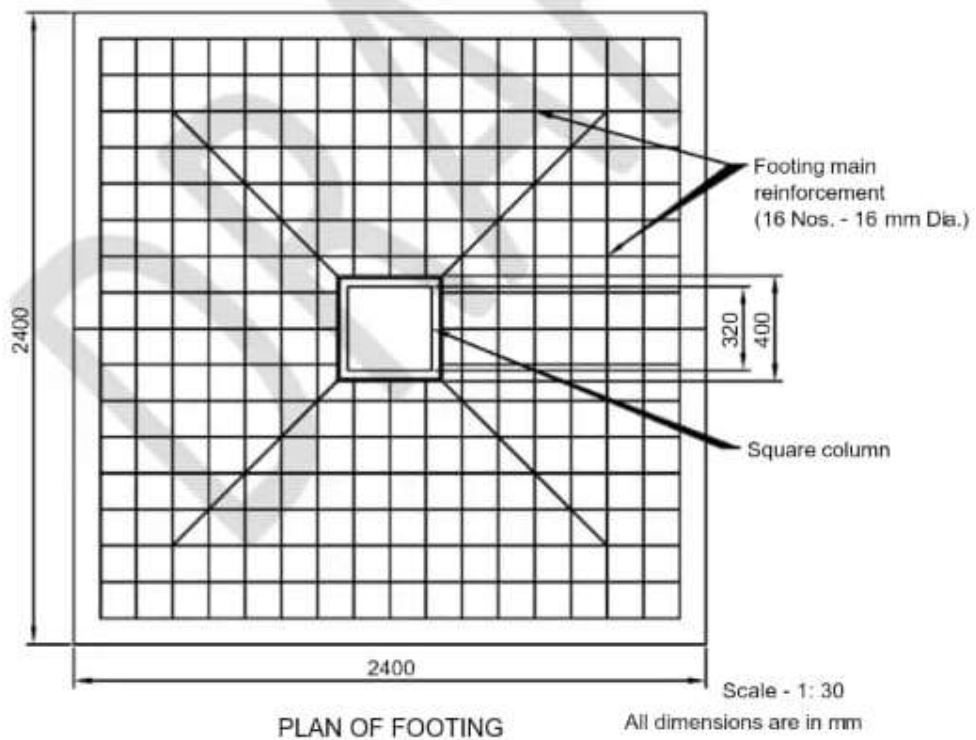
172

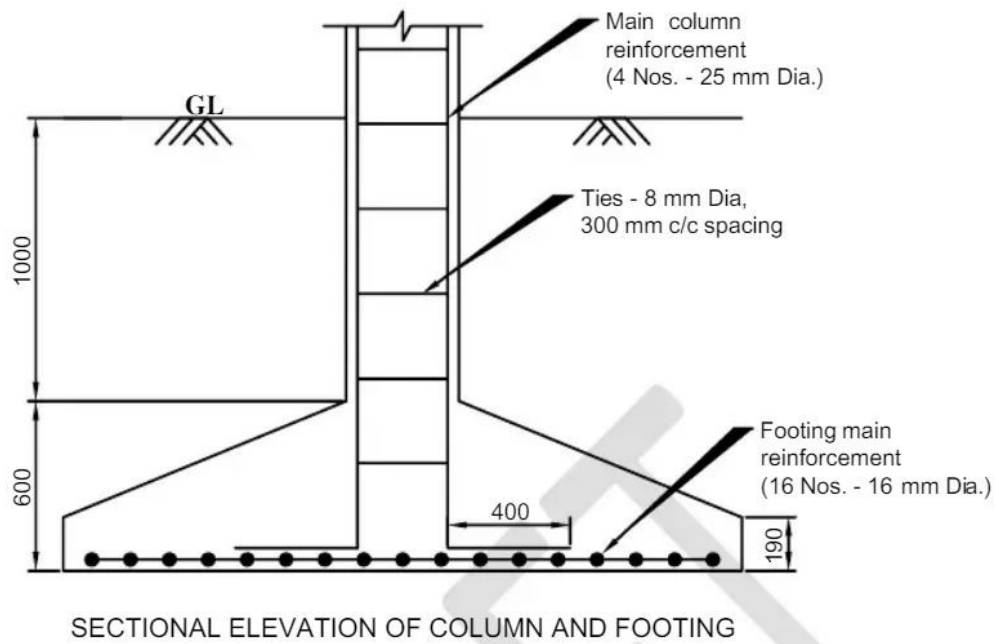SECTIONAL ELEVATION OF COLUMN AND FOOTING

PLAN OF FOOTING

Scale - 1 : 30
All dimensions are in mm

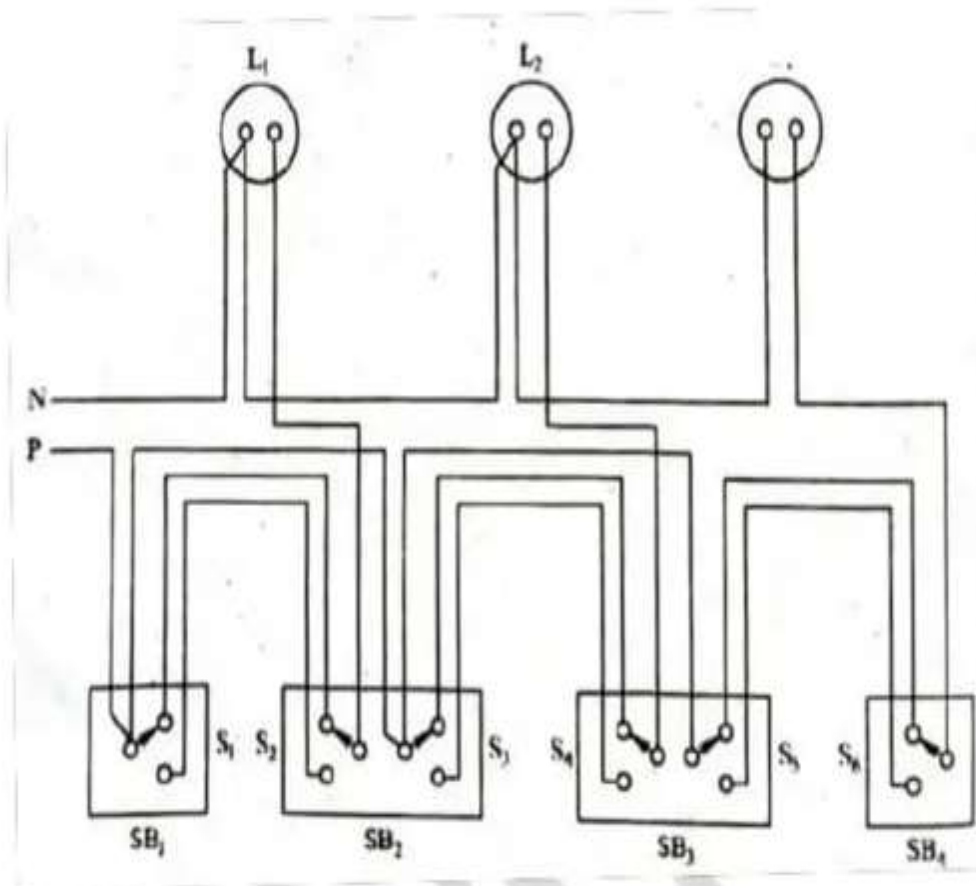**Fig.8 RCC column with square isolated footing**
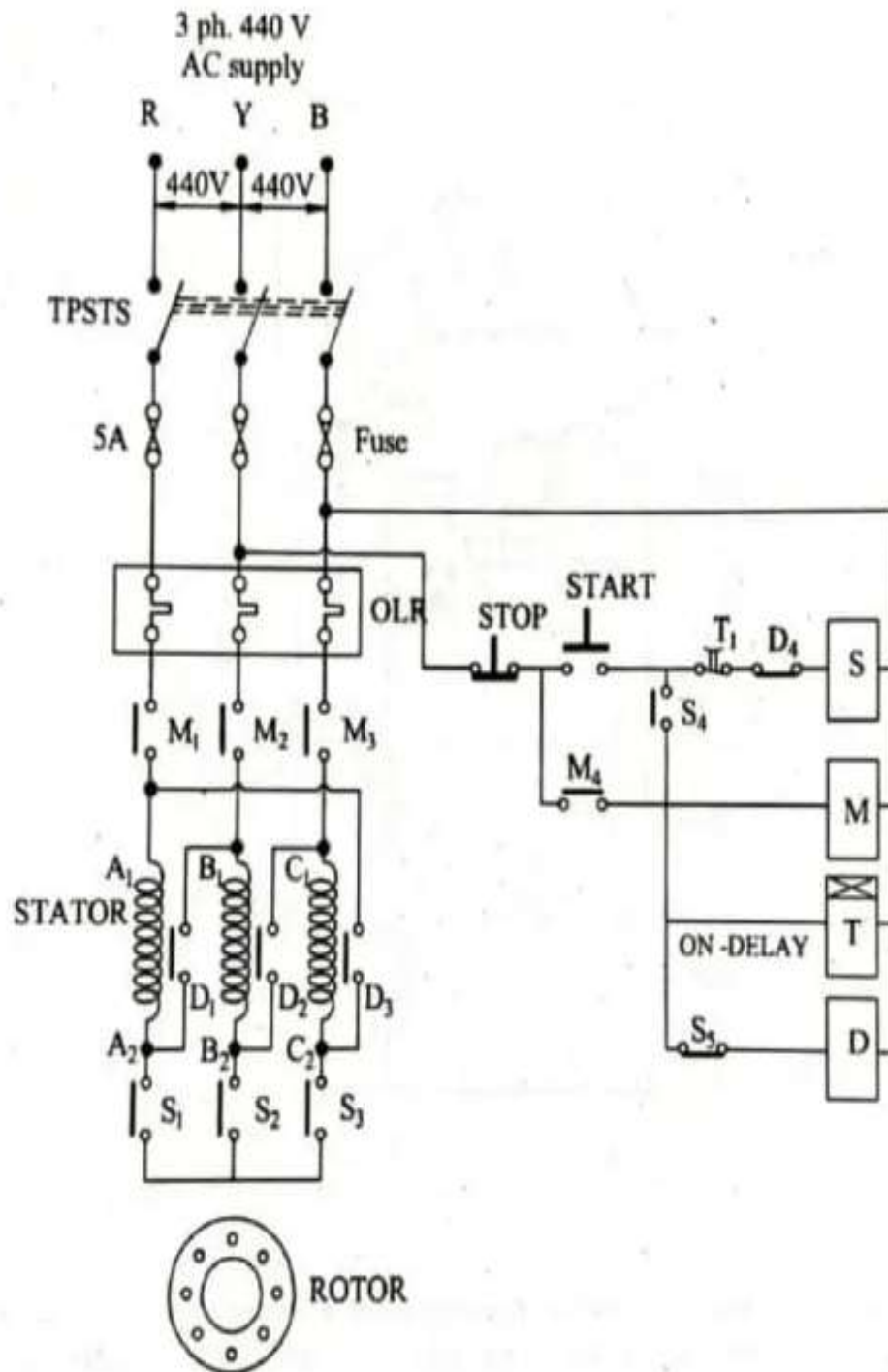
Fig.5. Staircase wiring electric circuit

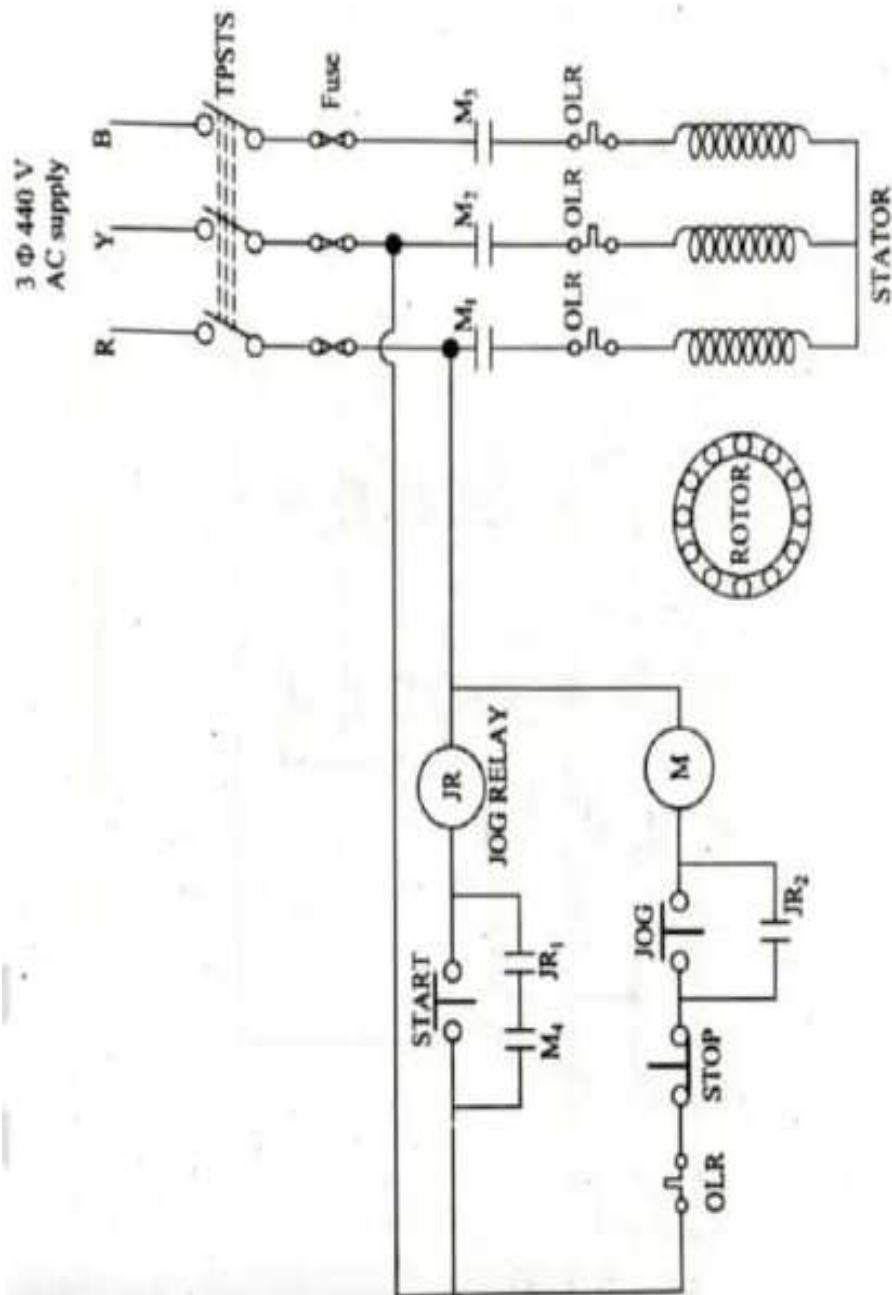Fig.6. Control and main circuit for automatic star delta starter

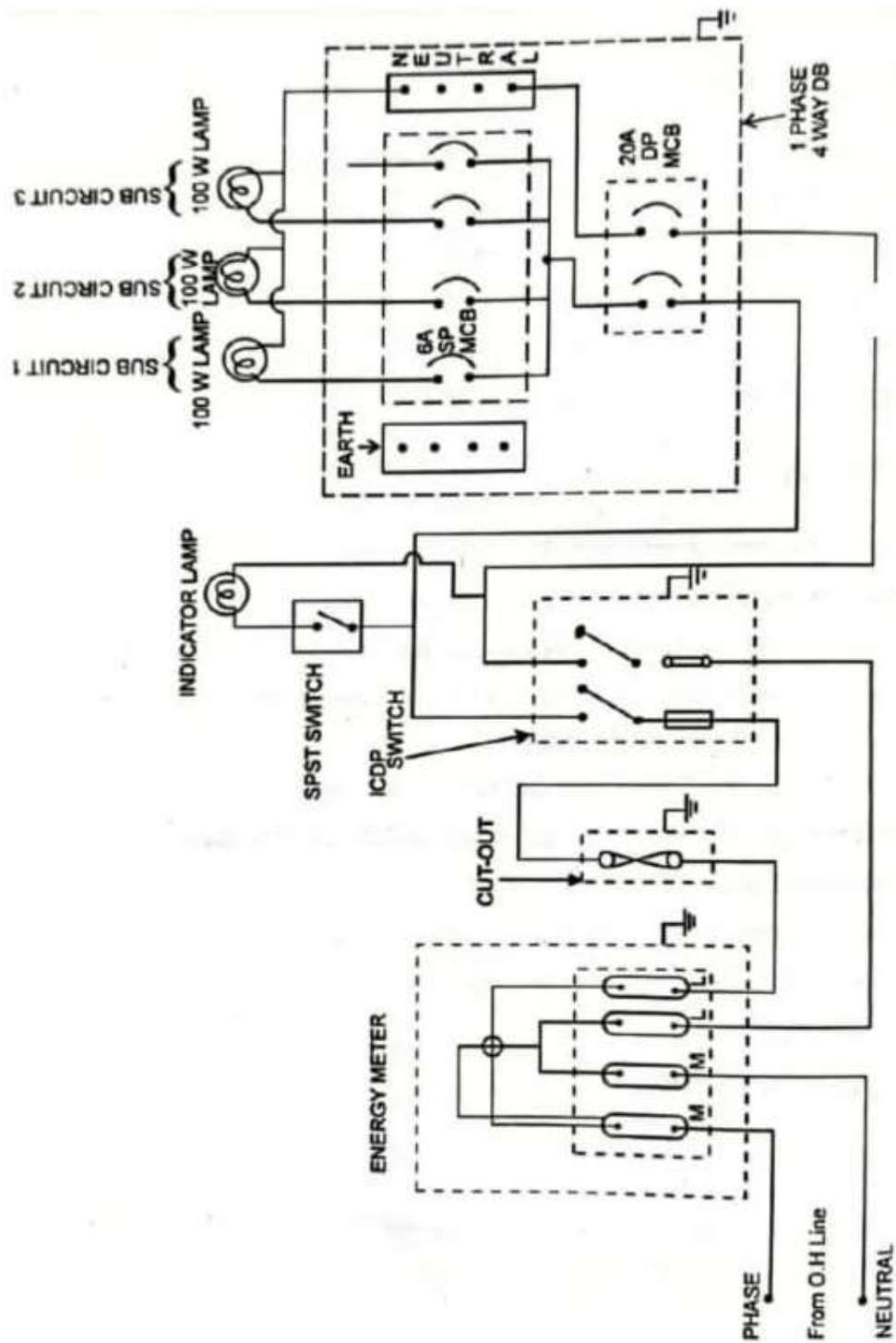**Fig.7. Control circuit for jogging in cage induction motor**

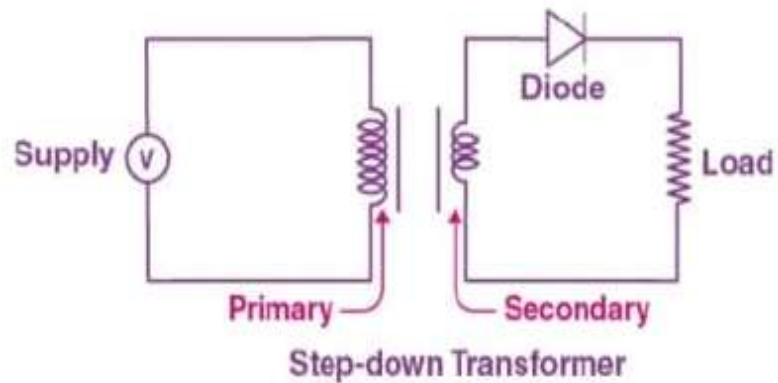**Fig.8. Single phase wiring circuit**

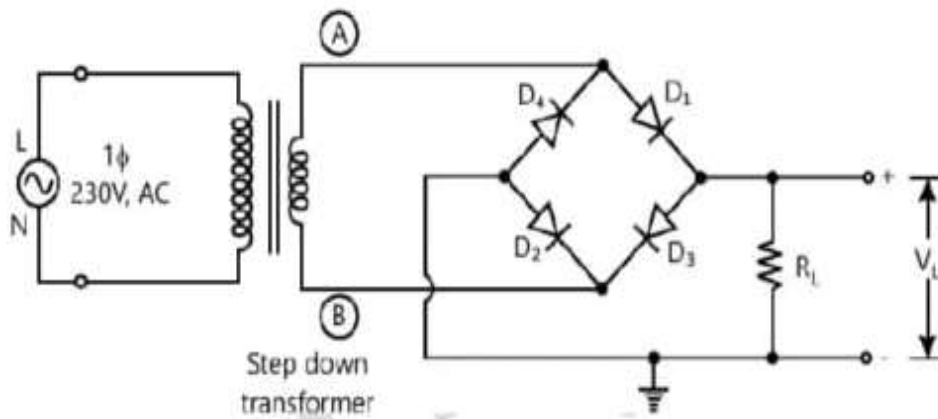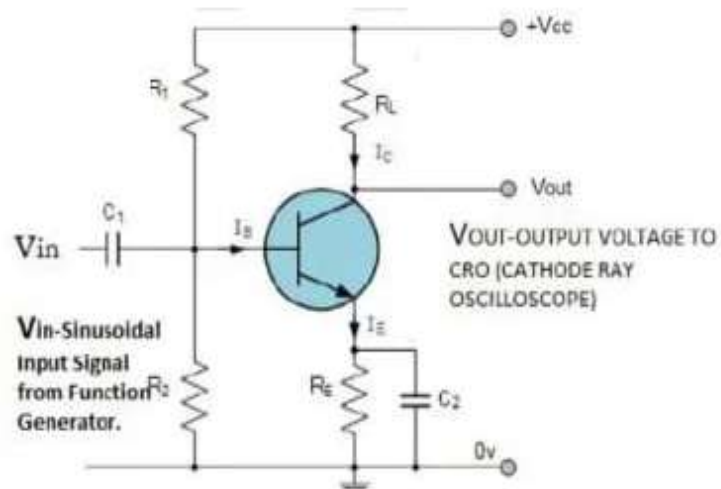Fig.5. Half wave rectifier circuit

Fig.6. Bridge rectifier circuit

Fig.7. Common emitter amplifier circuit

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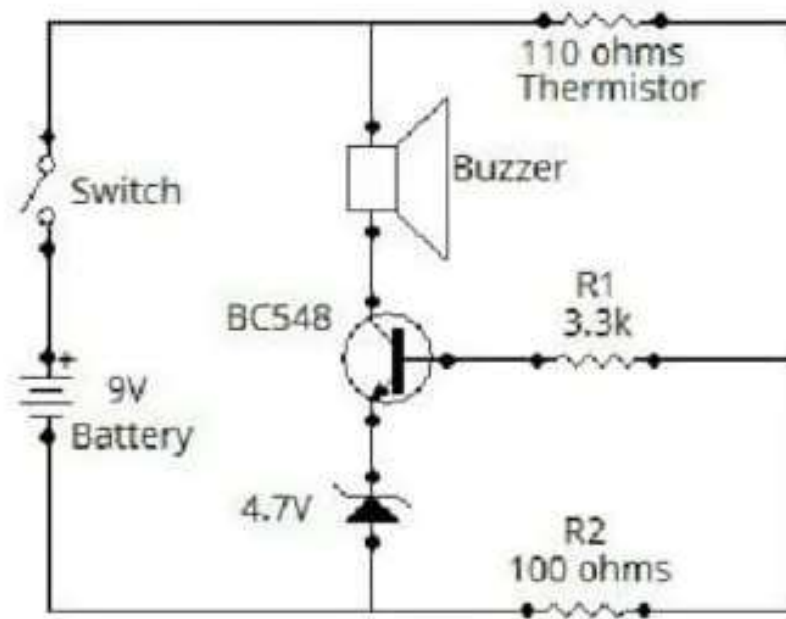
Fig.8. Fire alarm circuit

CORE COURS

CEH201	BASICS OF CIVIL ENGINEERING	L	T	P	C
Theory		3	0	0	3

Introduction

The course is designed to provide a comprehensive introduction to the field of Civil Engineering offering fundamental knowledge across various sub - discipline within this field. It is tailored to meet the educational requirements typically outlined in the syllabus for diploma studies in Engineering. The topics covered are based on the syllabus for diploma studies in Engineering and technology. The contents are arranged in sequence that starts from the basic concepts and followed in the List of materials, Details of materials, Introduction to Building Planning and Building Construction, Introduction to Surveying, Levelling and Advancements in Civil Engineering. Throughout this course, students can expect to acquire a solid foundation in Civil Engineering providing those with valuable insights into the complexity of industrial projects are the skills required for success in this field. The goal is to equip students with the knowledge and expertise needed to excel in the diverse and challenging world of Civil Engineering.

Course Objectives

The objective of this course is to enable the students to learn about:

- Introduction of Civil Engineering: Provide students with a fundamental understanding of the field and its significance in various industries and society.

- Foundational knowledge: Impart essential principles, theories and concepts in physics, mathematics and materials science that are pertinent to Civil Engineering.

- Materials Understanding: Familiarize students with the properties and usage of common construction materials like concrete, steel and timber.

- Building Planning: Enable the students to comprehend architectural plans, designs and considerations for constructing safe, functional and aesthetically pleasing buildings.

- Surveying Skills and Levelling Proficiency: Illustrate the basics of land measurements, surveying instruments and techniques for precise mapping. Provide knowledge and skills related to levelling techniques to ensure accurate elevation measurements in construction projects.

- Awareness of Advancements: Explore the emerging technologies and trends in Civil Engineering, promoting an understanding of the field's ongoing evolution.

Course Outcomes

After the successful completion of this course, the students should be able to,
CO.1: Describe the uses of different materials in Civil Engineering.
CO.2: Interpret the various aspects of the building planning.
CO.3: Identify the various building components and methods of constructions.
CO.4: Illustrate the different equipment's for angular and linear measurements.
CO.5: Describe various public transportation systems, water conservation methods and advances in Civil Engineering.

Pre-requisites: NIL

CEH201	BASICS OF CIVIL ENGINEERING	L	T	P	C
Theory		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	1	1	1	3
CO2	3	1	1	1	1	1	3
CO3	3	1	1	1	1	1	3
CO4	3	1	1	1	1	1	3
CO5	3	1	1	1	1	1	3

Legend: 3- High Correlation. 2 - Medium Correlation. 1 - Low Correlation.

Instructional Strategy

- Engage and Motivate Teachers: Teachers should actively students to boost their leaning confidence.

- Real-World Relevance: Teachers are expected to physically show various building materials while imparting instructions. Students should be encouraged to collect sample of various building materials so as to create a museum of materials in the polytechnic.

- Interactive Learning: Teachers are expected to organize demonstrations and field visits to show various stages of construction operations, use of various measurements. Instruments in surveying and also train the students to use appropriate instruments to avoid/ minimize errors during surveying for better learning experiences.

- Application Based Learning: Throughout the course, a theory-demonstrate- practice activity strategy may be used to ensure the outcome of the learning is employability based one.

- Simulation and Real-World Practice: In addition to theoretical instructions, different activities pertaining to the simulated Environment, transitioning to real-world scenarios when possible, like expert lectures, seminars, visits to green house, effluent treatment plant of any industry, rain water harvesting plant etc. may also be organized.

- Encourage Critical Analysis: Foster an environment where students can understand the experiment outcomes and infer the potential sources of error in case of any discrepancies.

CEH201	BASICS OF CIVIL ENGINEERING	L	T	P	C
Theory		3	0	0	3

Assessment Methodology

	Continuous Assessment Test (40marks)			End Semester Examination (60 marks)
	CAT 1	CAT 2	CAT 3 (Model)	
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

CEH201	BASICS OF CIVIL ENGINEERING	L	T	P	C
Theory		**3**	**0**	**0**	**3**

Unit I	INTRODUCTION TO CIVIL ENGINEERING AND CIVIL ENGINEERING MATERIALS	
Introduction to Civil Engineering – Various disciplines of Civil Engineering - Scope, Impact - Role of Civil Engineer - Units of measurement - Unit conversion (Length, Area, Volume) - List of materials, Details (types, properties, uses) of materials: Cement, Aggregate, Brick, Steel, Concrete, Stone, Soil, Mortar, Timber, Plastic, Epoxy, Fly Ash, Steel slag, Copper slag, Bitumen, Optical fiber, Pipe, Wire, Cable and FRP.	10 Hrs

Unit II	INTRODUCTION TO BUILDING PLANNING	
Introduction: Introduction to National Building Code of India 2016 and its parts – Classification of buildings Conventions, Symbols: General – Conventions - Title block- Scales- Line work- Lettering- Symbols-Abbreviations. **Building Bye-Laws:** Objects of bye-laws - Importance of bye-laws- Function of local authority - Setbacks - Plot Coverage - Number of floors - Height of building - Built up Area - Floor space index (FSI) - Views and details necessary for the preparation of a Civil Engineering drawing. **Planning of Buildings:** Basic requirements, elements - Introduction to various buildings, computation of plinth area, computation of carpet area - Introduction to the types of buildings as per NBC - Selection of site for construction of buildings - Components of a residential building - Requirements - Types of Rooms – Minimum Size requirement for each type of rooms - Introduction to the Industrial buildings - Types - Introduction to the public buildings - Types - General requirements of Public Buildings.	10 Hrs

Unit III	BUILDING CONSTRUCTION	
Building Construction – Foundations, Classifications - Masonry Works – classifications, definition of different technical terms, Roofs – functional requirements, basic technical terms, roof covering materials, Floors – functions, types, flooring materials (brief discussion), Plastering and Painting – objectives, types.	08 Hrs

Unit IV	INTRODUCTION TO SURVEYING AND LEVELLING	
Introduction, Conventional systems of measurements, Fundamental principles, Classifications. Linear measurement: Instruments used, Chain Survey on plane ground, Offset, Ranging. **Angular measurement:** Compass - Instrument used, Meridian, Bearing and Local	09 Hrs

attraction. **Leveling:** Instrument used, Terminology, Types of leveling, and Methods of leveling, Introduction to contour survey. **Modern tools:** Introduction to Theodolite, Total Station, Introduction to Global Positioning System (GPS) and Geographic information system (GIS).		
Unit V	**ADVANCEMENTS IN CIVIL ENGINEERING**	
Mass Transportation systems - Bus Rapid Transit System (BRTS), Metro Railway, Solid waste management systems, Rainwater harvesting systems, Smart city and its features, Green buildings, Energy efficient buildings, Heritage structures & its conservations - Descriptions with Sketches only.		08 Hrs
TOTAL HOURS		**45** Hrs

Suggested List of Students Activities

- Draw the line plan of 1BHK, 2BHK homes.
- Identification, demonstration & prepare sketches of Locally Available building materials
- Prepare Sketches of masonry works.
- Collect the information about modern survey instruments available in the market and prepare the report.
- Visit any one construction site and prepare the construction activity report
- Presentations about any recent technological developments in Civil Engineering field
- Study the Road, Rail Transportation systems, Rainwater harvesting systems in your city or nearest place and submit the reports
- Conduct class quizzes on a fortnightly basis.
- Prepare Models of any one of the following - Residential building, Commercial, Primary health center, School building
- Micro project that shall be an extension of any practical lab exercise to real-world Civil Engineering application

Reference Books

- S.C. Rangwala, Engineering Material, Charotar Publication.
- S.C. Rangwala. Civil Engineering Drawing, Charotar Publication.
- Gurucharan Singh, Building planning, designing and scheduling, Standard Publisher.
- Dr. B. C. Punamia, Building Construction Publisher: Laxmi Pub. Delhi.
- N. N. Basak, Surveying and leveling, Tata McGraw Hill Education.
- H.S. Peavy, D.R. Rowe and G. Tchbanoglous, Environmental Engineering, McGraw Hill International Edition.
- Khanna S. K. and Justo C. E.G., Highway Engineering, Publisher :Nemchand and Brothers.

- Papacostas C.S., Prevedouros, "Transportation Engineering and Planning, 3 rd Edition, Prentice Hall of India, New Delhi, 2002.
- Vukan R.Vuchie, Urban Transit Systems and Technology, John Wiley and Sons, 2007.
- M.S.Palanichamy, Basic Civil Engineering, McGraw Hill.S.
- Ramamrutham, Basic Civil Engineering , Dhanpatrai Publication.
- Gkhirasaar, Basic Civil Engineering Dhanpatrai Publication.
- SS Bhavikatti, Introduction to Civil Engineering, New Age international Publishers.

Web-based/Online Resource

- https://nptel.ac.in/courses/105106201
- https://nptel.ac.in/courses/105102088/
- https://nptel.ac.in/courses/124105013/
- http://nptel.ac.in/courses/105107122/
- http://nptel.ac.in/courses/105107157/
- https://nptel.ac.in/courses/105102015/
- http://nptel.ac.in/courses/105101087/
- http://nptel.ac.in/courses/105104100/
- https://nptel.ac.in/courses/105103205/
- https://nptel.ac.in/courses/105102195/

EEH201	**Basics of Environmental Engineering**	L	T	P	C
Theory		3	0	0	3

Introduction

      This course is designed to provide a comprehensive introduction to the field of Environmental and Civil Engineering, offering fundamental knowledge across various sub-disciplines within this field. It is tailored to meet the educational requirements typically outlined in the syllabus for diploma studies in Engineering. The topics covered are based on the syllabus for diploma studies in Engineering. The courses are arranged in sequence that starts from the Introduction to Environmental Engineering, Ecosystems and Environmental Pollution, Basic concepts of Civil Engineering and followed in List of materials, Details of materials, Introduction to Building Planning, Building Construction and Building Services.

      Throughout this course, students can expect to acquire a solid foundation in Environmental and Civil Engineering, providing them with valuable insights into the complexity of industrial projects and the skills required for success in this field. The goal is to equip students with the knowledge and expertise needed to excel in the diverse and challenging world of Environmental and Civil Engineering.

Course Objectives

The objective of this course is to enable the student to
- Introduction to Environmental Engineering: Provide Foundational Knowledge about Environmental Systems
- Provide Knowledge about Water, Waste Water Treatment process, Ecosystems and pollutions
- Civil Engineering**-** provide students with a fundamental understanding of the field and its significance in various Civil Industries and Society
- Materials Understanding: Familiarize students with the properties and usage of common construction materials like concrete, steel, and timber
- Building Planning and Services: Enable students to comprehend architectural plans, designs, and considerations for constructing safe, functional, and aesthetically pleasing buildings, Introduce concepts related to building infrastructure, including plumbing, electrical systems, HVAC, and fire protection

Course Outcomes

CO1	Describes the Various Environmental regulations ,Systems and Environmental Interaction
CO2	Describes various water conservation methods, water -waste water quality, Ecosystems, and various pollutions
CO3	Describes the Importance and Responsibilities of Civil Engineering
CO4	Describes the use of different materials in Civil Engineering
CO5	Identify the various building components, method of constructions , Interpret various aspect of the building planning and services

Pre-requisites: NIL

EEH201	Basics of Environmental	L	T	P	C
Theory	Engineering	3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	-	-	3	1	3	3	-	1
CO2	3	1	2	-	2	1	3	3	2	2
CO3	3	1	-	2	-	-	3	2	-	3
CO4	3	2	2	3	-	-	3	3	2	-
CO5	-	1	-	2	1	3	3	-	3	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications. Try to give source examples from where the students would be familiar - like models or an activity that they usually engage in frequently.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome- and employability-based.
- All demonstrations/Hands-on practices are under a simulated environment (may be followed by a real environment as far as possible).

EEH201	Basics of Environmental	L	T	P	C
Theory	Engineering	3	0	0	3

Assessment Methodology

	Continuous Assessment Test (40marks)			
	CAT 1	CAT 2	CAT 3 (Model)	End Semester Examination (60 marks)
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

EEH201	Basics of Environmental	L	T	P	C
Theory	Engineering	3	0	0	3

Unit I	INTRODUCTION TO ENVIRONMENTAL ENGINEERING	
Definitions, Scope, and Importance of Environmental Engineering. Need for Public Awareness. Historical perspective and evolution of Environmental Regulations Environmental compartments: air, water, soil, and their interactions. Overview of natural and engineered environmental systems.	09 Hrs
Unit II	ECOSYSTEM AND ENVIRONMENTAL POLLUTION	
Concepts of Ecosystem-Structure and Function of an Ecosystem- Producers, Consumers and Decomposers- Energy flow in Ecosystem- Ecological Succession- Pollution-Types, Sources, and Impacts of Environmental Pollutants. Roles of Individual in prevention of Pollution– Global and local Environmental Challenges - Climate Change, Green House Effect, Acid Rain.	09 Hrs
Unit III	INTRODUCTION TO CIVIL ENGINEERING	
Introduction- Definition, History, and Significance of Civil Engineering. Overview of Sub-Disciplines and their interconnections- Role of Civil Engineers in society. Ethical Considerations and Responsibilities.	09 Hrs
Unit IV	CIVIL ENGINEERING MATERIALS	
Building Materials - Geological classification of Rocks, Requirements of Good Building Stone, General Characteristics of Stone, Properties of Sand and uses, Classification of Coarse Aggregate according to size, Fine Aggregate-types-Characteristics of good Brick, Field tests on Bricks, Cement-Types and its uses –Timber - Types, properties and its uses, Steel-types and its uses, Plastics - Properties and uses of Plastics, Paintsand Distempers, Ingredients and their uses. Properties of good Paint, Varnishes with their uses, Flooring and wall tiles.	09 Hrs
Unit V	INTRODUCTION TO BUILDING PLANNING, CONSTRUCTION AND BUILDING SERVICES	
Introduction: Introduction to National Building Code of India 2016 and ts parts – Classification of buildings. **Conventions & Symbols:** General – Conventions- Title block- Scales- Line work- Lettering-Symbols-Abbreviations -Units of Measurement, Unit conversion (Length, Area, Volume). **Building Construction**: Types of Building, Types of loads acting on Building, Nominal dimensions for Door, Window and Furniture. **Building Services:** Symbols used for Water Supply, Plumbing and Sanitation. Types of Building services like Plumbing & Sanitation, Water Supply & Drainage System, electricity, Building finishes, HVAC.	09 Hrs
TOTAL HOURS	**45** Hrs

EEH201	Basics of Environmental Engineering	L	T	P	C
Theory		3	0	0	3

Suggested List of Students Activity

- Case study on the quality standards of drinking water in your locality
- Choose any one study area and estimate the quantity of water required to meet the demand
- Draw the line plan of 1BHK, 2BHK homes
- Identification, demonstration & prepare sketches of Locally Available building materials
- Prepare Sketches of masonry works
- Collect the information about modern survey instruments available in the market and prepare the report
- Visit any one construction site and prepare the construction activity report
- Presentations about any recent technological developments in Civil Engineering field
- Conduct class quizzes on a fortnightly basis.
- Micro project that shall be an extension of any practical lab exercise to real-world Civil and   Environmental Engineering Application

Reference Books

- S.C.Rangwala, "Water Supply and Sanitary Engineering" , Charotar Publishing House, New Delhi, 2007
- Khitoliya R.K."Environmental Pollution",S.Chand & Company Ltd
- Gilbert M.Masters,"Introduction to Environmental Engineering and Science" Prentice-Hall of India Pvt Ltd
- B.C Punmia," Environmental Engineering", Laxmi Publications, New Delhi, 2010
- Dr.Suresh, K.Dhamija, "Environmental Studies", S.K.Katarial Sons, Delhi, 2010
- M.S.Palanichamy, "Basic Civil Engineering", Tata McGraw Hill Education
- N.N.Basak, "Surveying and leveling", Tata McGraw Hill Education
- S.C.Rangwala. "Civil Engineering Drawing", Charotar Publication

EEH201	**Basics of Environmental**	L	T	P	C
Theory	**Engineering**	3	0	0	3

- Dr.B.C.Punmia, "Basics Civil Engineering", Laxmi Publication, Delhi

- Ramamrutham, "Basic Civil Engineering", Dhanpatrai Publication

- Gkhirasaar, "Basic Civil Engineering", Dhanpatrai Publication

- Satheeshgopi ,"Basic Civil Engineering" , Pearson Publication

- S.S Bhavikatti, "Introduction to Civil Engineering", New Age International Publishers.

Web-based/Online Resources

- http://nptel.ac.in/courses/105107122/

- http://nptel.ac.in/courses/105107157/

- http://nptel.ac.in/courses/105101087/

- http://nptel.ac.in/courses/105104100/

- www.svnit.ac.in

- http://www.nptel.iitm.ac.in/courses.php?branch=Civil

- https://youtu.be/OCXnlInDVOU?si=JkxRiTuVPQI_FrGS

- http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT

CRH201	Basics of Computer Engineering	L	T	P	C
Theory		3	0	0	3

Introduction

Understanding the basic components and working of a computer gives more freedom for the learners to explore and innovate. The knowledge about the various hardware and software devices will help the learners to choose the devices according to the needs. The ability to differentiate the types of software is essential in the career of a computer engineer. This course will inculcate the much-needed essential information about the computers in the minds of young engineers.

Course Objectives

The objective of this course is to enable the student to

- Comprehend the basics of computer organization.
- Investigate various input and output devices.
- Classify the different storage devices.
- Identify the types of software.
- Grasp the concept of the World Wide Web.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Remember the basic organization of computers.

CO2: Distinguish between the various input and output devices.

CO3: Examine the different storage devices.

CO4: Describe the types of software.

CO5: Identify the concept of the internet and security issues related to internet use.

Pre-requisites

Nil

CRH201	Basics of Computer Engineering	L	T	P	C
Theory		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	-	-	3	1
CO2	3	3	3	-	-	3	2
CO3	3	3	3	-	-	3	1
CO4	3	3	3	-	-	3	2
CO5	3	3	3	-	-	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.

- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.

- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.

- Application-Based Learning: Employ a theory-demonstrate-practice- activity strategy throughout the course to ensure outcome-driven learning and employability.

- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real- world scenarios when possible.

- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

CRH201	Basics of Computer Engineering	L	T	P	C
Theory		3	0	0	3

Assessment Methodology

	Continuous Assessment Test (40marks)			
	CAT 1	CAT 2	CAT 3 (Model)	End Semester Examination (60 marks)
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

CRH201	Basics of Computer Engineering	L	T	P	C
Theory		3	0	0	3

Unit I	INTRODUCTION TO COMPUTERS	
Introduction – Characteristics of Computers – Evolution of Computers - Data, Information and Program - Basic Computer organization - Central Processing Unit, Processor Speed, Arithmetic and Logic Unit (ALU), Memory Unit, Input and Output Unit.		8
Unit II	INPUT DEVICES AND OUPTUT DEVICES	
Introduction to Input Devices – Keyboard - Scanner - Microphone – Mouse (Optical Mouse, Mechanical Mouse), Touch Screen, Web Camera, Wearable Devices - Computer Output Fundamentals – Printers (Laser Printer, 3D Printers) – Monitors (Liquid Crystal Display, Light Emitting Diodes) - Projector – Speaker – Computer Cables (HDMI, VGA, USB, PS/2, Ethernet, 3.5mm jack).		10
Unit III	COMPUTER MEMORY AND STORAGE	
Introduction - Bits and Bytes – Memory Hierarchy - Primary Memory – Random Access Memory (RAM) – Read Only Memory (ROM) - Secondary Memory – Secondary Storage Devices – Hard Disk, Optical Disks, Flash Drive, Solid State Drives (SSD) – Cache Memory.		10
Unit IV	COMPUTER SOFTWARE	
Computer Software –Types of Software – System Software: Compilers, Linker, Loader, Operating Systems (Windows, Linux Basics) – Application Software: Word Processors, Presentation Software, Graphics Software - Difference between Program and Packages – Introduction to Python Programming - Real Time Applications of Software: ERP, Finance.		10
Unit V	INTERNET AND SECURITY	
Concept of Internet - Applications of Internet - Popular Web Browsing Software – Search Engines – Computer Ethics –Social Networks and E- Commerce - Cloud Computing Basics - Security Issues Over the Internet – Introduction to Cyber Security.		7
TOTAL HOURS		**45**

CRH201	**Basics of Computer Engineering**	**L**	**T**	**P**	**C**
Theory		**3**	**0**	**0**	**3**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

References

- Tamilnadu SCERT, Chapters 1-5, 17, Introduction to Computers, Number Systems, Computer Organization, Theoretical Concepts of Operating System, Working with Windows Operating System, Computer Ethics and Cyber Security, Computer Science, Class XI, 2022.
- NCERT, Chapter 1-3: Computer System, Encoding Scheme and Number Systems, Emerging Trends, Class XI, 2023.
- Tamilnadu SCERT, Chapter 15, Introduction to Internet and Email, Class XI, Computer Technology, 2019.
- Tamilnadu SCERT, Chapter 15, E-Commerce, Class XII, Computer Applications, 2022.
- Computer Programming and IT, Ashok N. Kamthane, Raj Kamal, Pearson India, 2012, ISBN: 9788131774694
- Computer Ethics Etiquette and Safety (for the 21st century student), Nancy E. Wilfred, Viva Books Private Limited 2009. ISBN-13 : 978- 8130909042
- Cloud Computing, A. Srinivasan, Pearson India, 2014, ISBN: 9789332537439

Web-based/Online Resources

CPU Speed

https://www.intel.com/content/www/us/en/gaming/resources/cpu-clock-speed.html

Types of Computer Cable Connections

https://www.buildcomputers.net/computer-cable-connections.html

Social Network https://www.britannica.com/technology/social-network

ECH201	BASICS OF ELECTRONICS ENGINEERING	L	T	P	C
Theory		3	0	0	3

Introduction

Electronics is a vital branch of engineering that deals with the behavior and applications of electronic components and circuits. A strong foundation in electronic devices, measuring instruments, and basic systems is essential for students to grasp advanced topics and practical applications. This course provides an introductory platform for students to acquire knowledge and skills in basic electronics, bridging the gap to advanced courses.

Course Objectives

The course aims to enable students to:

- Understand the fundamental principles of electronic components, circuits, and devices.
- Gain an overview of semiconductors, diodes, and their applications in electronics.
- Develop proficiency in number systems, Boolean algebra, and logic gates.
- Learn about measuring instruments and display units, focusing on their working principles.
- Explore practical applications of commonly used electronic devices.

Course Outcomes

Upon successful completion of the course, students will be able to:

CO1: Apply the fundamental concepts of electronic components, semiconductor diodes, digital logic circuits, measuring instruments and audio-visual Communication Devices to solve basic engineering problems.

CO2: Analyse the characteristics and performance of semiconductor devices, logic circuits, and measuring instruments to identify their applications in real-world engineering problems.

CO3: Design basic logic circuits by applyingconcepts on number system and logic gates.

CO4: Prepare an oral presentation on the applications of semiconductor devices, digital electronics, and measuring instruments in modern consumer electronics, demonstrating an understanding of societal and technological advancements.

Pre-requisites
NIL

ECH201	BASICS OF ELECTRONICS ENGINEERING	L	T	P	C
Theory		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1
CO1	3	1	1	-	-	-	-	
CO2	2	3	1	-	-	-	-	
CO3	2	2	3	-	-	-	-	3
CO4	2	1	1	-	3	-	3	

Legend: 3- High Correlation. 2 - Medium Correlation. 1 - Low Correlation

Instructional Strategy

Interactive Learning: Utilize multimedia presentations, hands-on activities, and interactive sessions.

Practical Demonstrations: Conduct live demonstrations of measuring instruments, displays, and circuit behavior.

Project-Based Learning: Encourage students to undertake micro-projects on device applications.

Simulation Tools: Use simulation software for Boolean algebra and logic circuit analysis.

Critical Thinking: Promote discussions and activities that require analyzing and troubleshooting circuit/system issues.

ECH201	BASICS OF ELECTRONICS ENGINEERING	L	T	P	C
Theory		3	0	0	3

Assessment Methodology

	Continuous Assessment Test (40marks)			
	CAT 1	CAT 2	CAT 3 (Model)	End Semester Examination (60 marks)
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

ECH201	BASICS OF ELECTRONICS ENGINEERING	L	T	P	C
Theory		3	0	0	3

Unit I	ELECTRONIC COMPONENTS	
Introduction to Electronics: Active Components-Passive Components-Basics of Resistor & its colour code, Inductor & Capacitor. **Important terms:** Voltage-Current - Power using Ohm's law, Frequency - Time period-DC - AC Sources		9
Unit II	**INTRODUCTION TO SEMICONDUCTORS AND DIODES**	
Introduction: Classification of Materials based on Electrical Property –Conductor-Insulator-Semiconductor Semiconductor: Classification – Intrinsic –Extrinsic-Doping-P-type- N-type. PN Junction Diode: Construction –symbol-working-Forward Bias –Reverse Bias-VI characteristics-Application		9
Unit III	**NUMBER SYSTEMS AND LOGIC GATES**	
Number systems: Introduction–Decimal-Binary-Octal -Hexadecimal number system **Boolean Algebra**: Definition – Boolean Operators **Basic Logic Gates:** AND-OR-NOT-NAND-NOR-XOR-XNOR– Symbols- Truth table		9
Unit IV	**MEASUREMENT INSTRUMENTS AND DISPLAY UNITS**	
Measuring Instruments: Basics and representation of Voltmeter –Ammeter-Multimeter -Cathode Ray Oscilloscopes. **Display Units:** LED-LCD display-Seven segment display-working principle.		
Unit V	**APPLICATION OF DEVICES**	
Concepts on Loud Speaker, Mobile Phone, Microphone, Television, Radio		9
TOTAL HOURS		45

ECH201	BASICS OF ELECTRONICS ENGINEERING	L	T	P	C
Theory		3	0	0	3

Unit I	ELECTRONIC COMPONENTS	
Introduction to Electronics: Active Components-Passive Components-Basics of Resistor & its colour code, Inductor & Capacitor. **Important terms:** Voltage-Current - Power using Ohm's law, Frequency - Time period-DC - AC Sources		9
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Unit V	**APPLICATION OF DEVICES**	
Concepts on Loud Speaker, Mobile Phone, Microphone, Television, Radio		9
TOTAL HOURS		45

ECH201	BASICS OF ELECTRONICS ENGINEERING	L	T	P	C
Theory		3	0	0	3

Suggested List of Students Activities

- ➢ **Identify and Demonstrate Basic Electronic Components**
    - o Collect and identify active and passive components like resistors, capacitors, and diodes. Prepare sketches for the same.
- ➢ **Analyze and Prepare Resistor Color Code Charts**
    - o Create a detailed chart explaining resistor color codes, calculate resistance values, and verify using a multimeter.
- ➢ **Construct Simple Electronic Circuits**
    - o Build basic DC and AC circuits using resistors, capacitors, and LEDs. Observe and document their behavior under different conditions.
- ➢ **Study and Demonstrate Diode Characteristics**
    - Plot the VI characteristics of a PN junction and Zener diode using practical setups and analyze their applications.

- ➢ **Demonstrate Number System Conversions**
    - Practice and present the conversion between binary, decimal, octal, and hexadecimal number systems with examples.

- ➢ **Prepare Truth Tables for Logic Gates**
    - Construct circuits for AND, OR, NOT, NAND, NOR, XOR, and XNOR gates using breadboards or simulation software and verify truth tables.

- ➢ **Research and Report on Modern Measuring Instruments**
    - Collect information on the latest multimeters, oscilloscopes, and other measuring instruments available in the market.

- ➢ **Visit an Electronics Lab or Industry**
    - Visit a facility to observe the practical usage of components like CROs, LED/LCD displays, and soldering techniques, and prepare a report.

- ➢ **Class Quizzes**
    - Conduct fortnightly quizzes on topics such as electronic components, Boolean algebra, and logic circuits.

- ➢ **Mini Projects**
    - Develop a micro-project integrating basic circuits and display units (e.g., LED-based counter or temperature indicator).

ECH201	BASICS OF ELECTRONICS ENGINEERING	L	T	P	C
Theory		3	0	0	3

Reference Books

1. **Robert Boylestad and Louis Nashelsky**, *Electronic Devices and Circuits Theory*, Pearson Education.
2. **Donald A. Neamen**, *Semiconductor Physics and Devices*, McGraw Hill Education.
3. **David A. Bell**, *Electronic Devices and Circuits*, Oxford University Press.
4. **A. Anand Kumar**, *Fundamentals of Digital Circuits*, PHI Learning.
5. **B.L. Theraja**, *Basic Electronics: Solid State*, S. Chand Publishing.
6. **V. K. Mehta and Rohit Mehta**, *Principles of Electronics*, S. Chand Publishing.
7. **Paul Horowitz and Winfield Hill**, *The Art of Electronics*, Cambridge University Press.
8. **J.B. Gupta**, *Electronic Devices and Circuits*, S.K. Kataria and Sons.

Web-Based/Online Resources

1. Basic Electronics - NPTEL
2. Digital Circuits - NPTEL
3. Semiconductor Devices - NPTEL
4. Measurement Systems - NPTEL
5. Introduction to Logic Design - NPTEL
6. Electronic Devices Hub
7. All About Circuits
8. Electronics Tutorials

ICH201	Basics of Electronics and	L	T	P	C
Theory	Instrumentation	4	0	0	4

Introduction

Any student of diploma in Instrumentation and control Engineering will be required to work with various instrumentation devices when he/she reaches the industry. As most of the devices are electrical and electronics based, the student is required to develop a basic understanding of the concepts and related terms of electricity, electronics, and Instrumentation which is in this backdrop that this course has been designed. An Instrumentation Engineer must be familiar with basics of measurements, measuring units, calibration of instruments which is also dealt in this subject

Course Objectives

The objective of this course is to enable the students to

- Identify the different types of Passive components
- Identify the different types of Active components
- Explain the working of passive and active components
- Define Instrumentation and to identify the instrument
- Explain the static and Dynamic characteristics of Instrument
- Explain the calibration and can do the calibration of ammeter, voltmeter and Thermometer
- To identify the different types of error occurring during measurement
- Identify the different types of switches and relays and can use it in the circuit

Course Outcomes

After successful completion of this course, the students should be able to

CO1: identify the different types of passive and active components

CO2: gain knowledge about various types of switches and relays

CO3: understand basic concepts of instrumentation system and its performance characteristics

CO4: acquire knowledge about calibration and errors in instruments

Pre-requisites

High School Physics – Electrical and Electronics Fundamentals

ICH201	Basics of Electronics and Instrumentation	L	T	P	C
Theory		4	0	0	4

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	3			
CO2	3	1	2	1			
CO3	3	1	2	1			
CO4	3	1	2	1			
CO5	3		3	3			

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers have to use different teaching methods to stimulate the interest of students in learning.
- To help students to learn different types of electrical, electronic components, switches and relays. Teachers should use PPT presentation of image and symbol of components and to show video of application of the components. Also should explain examples from daily life, realistic situations, and real-world engineering and technological applications.
- Students may be shown all the electrical and electronic components, switches and relays in the lab. The demonstration can make the subject exciting and foster in the students a scientific mind set. Student activities should be planned on all the topics.
- Demonstration method may be used with step by step procedure to test the various components using meters.
- Teachers are advised to follow inductive strategy to help the students to discover the working principle of various components, switches and relays.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where could be the source of error, if any.

ICH201	**Basics of Electronics and**	L	T	P	C
Theory	**Instrumentation**	4	0	0	4

Assessment Methodology

	Continuous Assessment Test (40marks)			
	CAT 1	CAT 2	CAT 3 (Model)	End Semester Examination (60 marks)
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

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ICH201	Basics of Electronics and Instrumentation	L	T	P	C
Theory		4	0	0	4

Unit I	PASSIVE COMPONENTS	
Resistor - symbol - Equation - colour coding - Fixed Resistor - types – carbon composition - Wire wound – thick film - thin film - Variable Resistor - types – potentiometer - rheostat - trimmer.		4
Inductor - symbol and unit - working - self and mutual inductance – Reactance - types of inductors- air core - ferrite core - toroidal core - applications.		4
Capacitor - symbol and unit - working of capacitor- identification of value of capacitor- Reactance - types of capacitors – fixed - polarized – electrolytic - non polarized – ceramic - film - mica - variable capacitor – tuning - trimmer - applications.		4
Unit II	ACTIVE COMPONENTS	
Semiconductor - classification - intrinsic – doping - extrinsic - P type and N type semiconductor - PN junction diode - Forward and Reverse bias – VI characteristic – Zener Diode - working - VI Characteristic - Photo Diode - Light Emitting Diode - LASER Diode.		6
Transistor – symbol- Types – PNP transistor- NPN Transistor -Construction and working- CB – CE - CC configuration – Characteristics – comparison - Phototransistor – working principle		6
Unit III	SWITCHES AND RELAYS	
Switch - Characteristic of switch - Types - Mechanical switches – Instrumentation switches – Electronic switches.		2
Mechanical Switches – symbol - Working – SPST – SPDT – DPST – DPDT pushbutton switch - Toggle switch		3
Instrumentation Switches - Limit Switch - Float switch – Flow switch - Pressure switch - Temperature switch - Joystick switch -Rotary switch		2
Electronic Switches - Diode as switch - Transistor as Switch – working.		2
Relay - Construction and Working - symbol - types - SPST - SPDT - DPST - DPDT relays - Applications.		3

Unit IV	BASICS OF INSTRUMENTATION	
Instrumentation – definition - evolution - scope in industries - generalized Instrumentation systems block diagram representation -Measuring Instruments - Static and Dynamic characteristics of measurement systems.		6
Pressure – definition - absolute and gauge pressure – units – conversion - temperature – units – conversion - flow rate - units.		6
Unit V	CALIBRATION AND ERROR	
Calibration – definition - need for calibration – standards - International Standards - Primary – Secondary - Working Standards - Calibration of Ammeter - Calibration of Voltmeter - Calibration of Thermometer.		6
Errors in Measurements – types - limiting error - gross error - systematic error-instrumental error - environmental error - observational error - simple problems. instrumental error - environmental error - observational error - simple problems.		6
TOTAL HOURS		**60**

Suggested List of Students Activity (Ungraded)

- Check the web portal for Image and video of different types of Electrical, Electronics Components, Switches and Relays.
- Periodical quizzes should be conducted on a a weekly/fortnightly basis to reinforce the symbols, units, image of different types of components, and working principles
- Students might be asked to find the various components in real life equipment, circuits.
- Students might be asked to see the demonstration video of various electrical electronics components.
- Students might work the series and parallel connection, working of components using simulation software in the virtual laboratory web portal.

Reference

- V K Metha, Rohit Metha, Principles of Electronics , S Chand Publications
- B L Theraja, Basic Electronics - Solid State, S Chand and Company Limited
- A.K.Sawhney, Electrical and Electronic Measurements and Instrumentation, Dhanpat rai & sons, Educational and technical publishers, Delhi

Web Reference QR Codes

Sl.No	Topic	QR Code
1.	Resistors	
2.	Inductors	
3.	Capacitors	
4.	Switches	
5.	Relay	
6.	Diode	
7.	Transistors	
9.	Transistor Animation Video	

ICH271	Basics of Electronics and	L	T	P	C
Practical	Instrumentation Practical	0	0	2	1

Rationale

This subject helps to reinforce their understanding of electronic principles and instrumentation techniques. This subject allows students to develop important skills such as circuit construction, testing, and the use of various instruments. These skills are essential for a career in Electronics and Instrumentation Engineering. Practical exercises are essential for teaching students how to calibrate and use various measuring instruments. Understanding how to accurately measure and record data is crucial in many fields, including research and industry.

Course Objectives

The objective of this course is to enable the student

- To find the value of resistor, inductor and capacitor using multimeter
- To construct the circuit to learn the behavior of capacitor and inductor
- To use the diode and transistor as switch
- To examine the static characteristics of Instrument and to perform statistical analysis on measured readings.
- To calibrate the given ammeter, voltmeter and thermometer

Course Outcomes

After successful completion of this course, the students should be able to

CO1:   identify the active and passive electronic components

CO2:   familiarize the application of active components

CO3:   analyze the statistical data of measuring parameters

CO4:   acquire knowledge about static characteristics of instruments

Pre-requisites

Nil

ICH271	Basics of Electronics and	L	T	P	C
Practical	Instrumentation Practical	0	0	2	1

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3			
CO2	3	2	3	3			
CO3	3	3	2	3			
CO4	3	3	2	3			

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

ICH271	Basics of Electronics and	L	T	P	C
Practical	Instrumentation Practical	0	0	2	1

Assessment Methodology

Type of Assessment	Duration	Marks	Converted to	Marks	Remarks
Observation	-	-	20	20	-
Record	-	-	20	20	-
Total				40	

SCHEME OF EVALUATION

End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Experimental Setup Diagram	20
B	Experimenting with Procedure	15
C	Readings Observed	10
D	Calculations / Graph	10
F	Viva Voce	05
TOTAL		60

ICH271	Basics of Electronics and	L	T	P	C
Practical	**Instrumentation Practical**	0	0	2	1

Assessment Methodology

Type of Assessment	Duration	Marks	Converted to	Marks	Remarks
Observation	-	-	20	20	-
Record	-	-	20	20	-
Total				**40**	

SCHEME OF EVALUATION

End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Experimental Setup Diagram	20
B	Experimenting with Procedure	15
C	Readings Observed	10
D	Calculations / Graph	10
F	Viva Voce	05
TOTAL		**60**

ICH271	**Basics of Electronics and**	L	T	P	C
Practical	**Instrumentation Practical**	0	0	2	1

Ex.No	Name of the Exercise	Hours
1	• Identify the value of given 5 different value of resistors using color code • Find the value of given 5 resistors using digital multimeter • Find the value of a resistor by constructing circuit with DC source, ammeter and voltmeter using Ohm's Law	2
2	• Identify the value of given capacitor (ceramic and electrolytic) • Construct a simple circuit with DC source, resistor, LED, 1000μF capacitor and voltmeter to examine the charging and discharging of capacitor. Observe the voltage building up.	2
3	• Identify the value of given Inductor • Construct a simple circuit with DC source, resistor, LED, Inductor and ammeter. Observe the current building up.	2
4	From the voltage and current rating of given LED, find the value of resistor required using Ohm's law and construct a simple circuit using DC source, resistor with LED and observe LED is glowing.	2
5	Construct a simple circuit using diode, resistor and LED to use the diode as switch. Observe LED glowing when forward bias and LED OFF when reverse biased.	2
6	Construct a simple circuit using transistor and relay to switch ON and OFF a 230V bulb through SPDT Relay	4
7	Conduct experiment to measure the voltage across a resistor using moving coil voltmeter in simple DC series circuit having 10V DC and two 1KΩ resistors in series. Observe minimum 6 readings by each individual of a batch. Perform statistical analysis with observed readings to find Arithmetic mean, deviation, standard deviation and variance.	4
8	Conduct experiment to measure the voltage across a resistor using moving coil voltmeter in a simple DC series circuit having 10V DC and two 1KΩ resistors in series. Observe the following static characteristics of the voltmeter: range, span, Accuracy, Precision and linearity.	4
9	Construct a simple circuit to calibrate the given ammeter and voltmeter	4
10	Calibrate the given thermometer	4
TOTAL HOURS		**30**

ICH271	Basics of Electronics and	L	T	P	C
Practical	Instrumentation Practical	0	0	2	1

Equipment Required

Sl. No	Item Description	Range	Quantity Required
1.	¼ Watt Resistors	100Ω, 1K, 2.2K, 3.3K, 4.7K, 10K	Each 10 Numbers
2.	Digital Multimeter	-	5
3.	Regulated Power Supply	(0-30V)	5
4	Ammeter	(0-10mA), (0-25mA), (0-50mA)	2 in each range
5	Voltmeter	(0-10V), (0-25V), (0-50V)	2 in each range
6	Ceramic and Electrolytic Capacitors	1 µF, 10 µF, 100 µF, 1000 µF, 22 µF	10 in each range
7.	Inductors		
8	LED	Forward Voltage: 1.8 to 5V (any value) Current: 20mA to 75mA (any value)	10
9	Diode	1N4007 / 1N4001	10
10	Transistor	BC107 / BC548	10
11	Relay	SPDT	5
12	230V Bulb with Holder	-	2
13	Thermometer	-	4

GTH201	**Basics of Textile Technology**	**L**	**T**	**P**	**C**
Theory		3	0	0	3

Introduction

  The basics of Textiles deal with fundamental concept of Textile Technology and also illustrate the basic outline and understand of the fibre science, spinning, weaving, wet processing and applications of textiles.

Course Objectives

- To understand the fibre and classification of textile fibres.
- To understand the outline of spinning process for production of cotton and synthetic yarn.
- To understand the outline of the weaving process.
- To understand the outline of textile wet processing.
- To study the application of textiles in various areas.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Summarize the natural and synthetic fibres

CO2: Summarize the process of yarn spinning

CO3: Correlate the different process of woven fabric formation

CO4: Illustrate textile wet processing

CO5: Develop applications of textiles in suitable fields

GTH201	**Basics of Textile Technology**	L	T	P	C
Theory		3	0	0	3

Assessment Methodology

	Continuous Assessment Test (40marks)			
	CAT 1	**CAT 2**	**CAT 3 (Model)**	**End Semester Examination (60 marks)**
Mode	Written Test (Theory)	Written Test (Theory)	Written Test (Theory)/Seminar	Written Examination (Theory)
Duration	2 hours		1 hour	2 ½ hours
Exam Marks	30	20	20	60
Converted to	15	15	10	60
Marks	15	15	10	60

Instructional Strategy

- It is advised that teachers take steps to attract student's attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples like daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster involvement the students a scientific mindset. Student activities should be observed and planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome - and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

GTH201	Basics of Textile Technology	L	T	P	C
Theory		3	0	0	3

Unit I	TEXTILE FIBRES	
Introduction, Definition of staple fibre, filament, Classification of natural and manmade fibres, Natural fibre – cotton, jute, wool & silk, cultivation of cotton, Introduction -Manmade fibres- polyester, nylon, polypropylene, polyethylene, Acrylic, carbon and Kevlar, end use of all textile fibres.		9
Unit II	**BASICS OF SPINNING**	
Introduction of spinning, Opening and cleaning of fibre, Name of the opening devices, Sequence of machines for yarn production from 100% cotton fibres, polyester/cotton blended fibres, 100% polyester staple fibres.		9
Unit III	**BASICS OF WEAVING**	
Introduction-Woven fabric–definition of warp, weft, sequence of preparatory process for weaving, material passage in power loom, Types of fabric-plain fabric, stripped fabric, checked fabric, printed fabric and end uses.		9
Unit IV	**BASICS OF WET PROCESSING**	
Definition - dyes, pigments, classification of natural and synthetics dyes, Sequence of preparatory process in dyeing, dyeing of cotton Fabric, Definition of printing, Definition of Finishing, Importance of finishing and Types of finishing.		9
Unit V	**APPLICATION OF TEXTILES**	
Major applications of Textiles- Apparels, Industrial applications- Geo Textiles, Medical Textiles, Protective textiles, Agro tech, home tech, Mobile tech, Oekotech, Pack tech, and sports textiles.		9
TOTAL HOURS		**45**

GTH201	**Basics of Textile Technology**	L	T	P	C
Theory		3	0	0	3

Suggested List of Students Activity (Ungraded)

- Presentation/Seminars by students on any recent technological developments based on recent development of Textile product.

- Periodic class quizzes conducted on a weekly/fortnightly basis to reinforce the basic textile subject concepts.

- Micro project that shall be an extension of practical lab exercise to real-world application.

- Instruct to the students that they have to interacted with aluminous of the department to know the current scenario of the textile market.

- The students should visit to the nearest industry, to acquire the practical knowledge in their interested area topics.

- Teacher / Lecturer should be motivated to their students to make small scale entrepreneur.

- Students have to develop the good relationship with core Company.

- The students have to read the latest research journal and upgrade their knowledge and to create the innovative products.

References

1. Wymne, A., The Motivate Textile Series, Macmillan Publishers Limited, 1997.

2. Bernard P. Corbman, Textiles: Fiber to Fabric, McGraw-Hill marketing, Sixth Edition1983.

3. Textile Hand book, The Hong Kong Cotton Spinner Association, First Edition , 2001

4. Horrocks, A.R & Anand, S.C. Handbook of Technical Textiles, Wood Head Publishing Limited, 2000.

5. Sabit Adanur, Handbook of Industrial Textiles, Johnston Industries Group, 1995.

6. Yasir Nawab (Ed), Textile Engineering An Introduction, Walter De Gruyter Oldenbourg, Boston, 2016.

GTH271	APPAREL MACHINERY	L	T	P	C
PRACTICUM	ENGINEERING PRACTICE	1	0	2	1

Introduction

The basic idea about the transmission of motion and power, A C motors limit switch, sensors and different types of meter will be taught to the students. Basics of Mechanical Engineering, Electrical Engineering and Electronics Engineering will enhance the student technical skills.

Course Objectives

The objective of this course is to enable the student to

1. To have knowledge of Drives
2. To know about clutches, brakes, belts, chains and gears
3. To have knowledge of fundamentals of electrical engineering
4. To understand the fundamental of electrical motors and Generators
5. To know about measuring instruments, sensors, and limit switch.

Course Outcomes

On successful completion of this course, the student will learn about

CO1: Belt Drives

CO2: Gears and Foots

CO3: Clutch, Bearing, Brake and cam

CO4: Measuring instruments and Sensors

CO5: Motors

GTH271	APPAREL MACHINERY	L	T	P	C
PRACTICUM	ENGINEERING PRACTICE	1	0	2	1

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	2	1	3
CO2	3	2	2	2	1	2	3
CO3	3	2	2	1	2	1	3
CO4	3	2	2	2	1	2	3
CO5	3	2	2	1	2	1	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation
Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples.
- The demonstration can make the subject exciting and foster in the students a scientific mindset.
- Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability based.

GTH271	APPAREL MACHINERY	L	T	P	C
PRACTICUM	ENGINEERING PRACTICE	1	0	2	1

Assessment Methodology

	Continuous Assessment Test(40 marks)				End Semester Examination (60 marks)	
	CAT 1	**CAT 2**	**CAT 3**	**CAT 4**		
Mode	Written Test	Written Test	Practical	Record	Practical Examination	
Duration	2 Hours	2 Hours	3 Hours	-	3 hours	
Exam Marks	50	50	100	100	Experiment	50
					Procedure	20
					Viva voce	10
					Written Examination (10 x 2)	20
					Total	100
Converted to	10	10	10	10	60	
Marks	40				60	
Total	100					

GTH271	APPAREL MACHINERY	L	T	P	C
PRACTICUM	ENGINEERING PRACTICE	1	0	2	1

Suggested to student activity

- Presentation/Seminars by students on any successful Management
- Periodic class quizzes conducted on a weekly/ fortnightly basis to reinforce the basic of Management concepts
- Instructed to the students will be interacted with aluminous of the Department to know the current scenario of the textile market
- The students should visit to the nearest industry, to acquire the practical knowledge in their interested area topics.
- Teacher / Lecturer should be motivated to their students to make small scale entrepreneur.
- Students have to develop the good relationship with Core Company
- The students have to read the latest research journal and upgrade their knowledge and to create the innovative ideas.

Reference

1. Thermal Engineering R.Rudramoorthy Tata Megraw Hills Educational pvt Ltd. New delhi 2010
2. Theory of machines, PL Ballaney, Kanna Pub, Delhi – 1980
3. Text book of machine design, R S Khurmi& J K Gupta, Eurasia Pub, Delhi - 1998
4. A Text Book on Hydraulics,Fluid Mechanics and Hydraulic machines R.S.KhurmiS.Chand& Co, Ram nager New Delhi-110055 1981
5. Thermal Engineering R.Rudramoorthy Tata Megraw Hills Educational pvt Ltd. New delhi 2010
6. A Text Book on Hydraulics,Fluid Mechanics and Hydraulic machines R.S.Khurmi S.Chand& Co, Ram nager New Delhi-110055 1981
7. Mechanical Technology V.Sivarajan V.K.Publishers
8. Welding and Welding Technology Richard. L. Little Tata Megraw Hills Pub.co.Ltd., 2005
9. A Text Book of Electrical Technology B.L.Theraja Publication Division,Niraja, New Delhi 2005
10. Electronic Principles Malvino Tata McGraw Hill Publication 2010 7 Electrical Machines SmarajitGhosh Person Education (Singapore) P.Ltd., Indian Branch - 482, FIE. Patparaganj .Delhi-110 092 2005.

BEH101 – TAMIL MARABU

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)
I. Answer <u>all</u> questions.

1.
2.
3.
4.
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7.
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9.
10.

PART – B (2x10= 50)

II. Answer <u>any two</u> questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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MODEL QUESTION PAPER

BEH102 - ENGINEERING MATHEMATICS

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)

I. Answer all questions.

1.
2.
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10.

PART – B (2x10= 50)

II. Answer any two questions.

(Question may have two subdivisions with equal marks)

11.

12.

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14.

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MODEL QUESTION PAPER

BEH103 - ENGINEERING PHYSICS

Time: 2 ½ Hrs   **Max Marks: 60**

<u>**PART- A (10X 1 = 10)**</u>

I. Answer <u>all</u> questions.

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<u>**PART – B (2x10= 50)**</u>

II. Answer <u>any two</u> questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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MODEL QUESTION PAPER

BEH103 - ENGINEERING CHEMISTRY

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)

I. Answer all questions.

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10.

PART – B (2x10= 50)

II. Answer any two questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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MODEL QUESTION PAPER

BEH201 – Tamil and Technology

Time: 2 ½ Hrs   **Max Marks: 60**

<u>**PART- A (10X 1 = 10)**</u>

I. Answer <u>all</u> questions.

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10.

<u>**PART – B (2x10= 50)**</u>

II. Answer <u>any two</u> questions.

(Question may have two subdivisions with equal marks)

11.

12.

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14.

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MODEL QUESTION PAPER

CEH201 – BASICS OF CIVIL ENGINEERING

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)
I. Answer <u>all</u> questions.

1.
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PART – B (2x10= 50)

II. Answer <u>any two</u> questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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MODEL QUESTION PAPER

EEH201 - Basics of Environmental Engineering

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)

I. Answer all questions.

1.
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PART – B (2x10= 50)

II. Answer any two questions.

(Question may have two subdivisions with equal marks)

11.

12.

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14.

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CRH201 - Basics of Computer Engineering

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)

I. Answer all questions.

1.
2.
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PART – B (2x10= 50)

II. Answer any two questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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MODEL QUESTION PAPER

ECH201 - BASICS OF ELECTRONICS ENGINEERING

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)
I. Answer all questions.

1.
2.
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PART – B (2x10= 50)

II. Answer any two questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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MODEL QUESTION PAPER

ICH201 - Basics of Electronics and Instrumentation

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)

I. Answer all questions.

1.
2.
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PART – B (2x10= 50)

II. Answer any two questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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MODEL QUESTION PAPER

GT201 - Basics of Textile Technology

Time: 2 ½ Hrs   **Max Marks: 60**

<u>**PART- A (10X 1 = 10)**</u>

I. Answer <u>all</u> questions.

1.
2.
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<u>**PART – B (2x10= 50)**</u>

II. Answer <u>any two</u> questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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MODEL QUESTION PAPER

IDH201 - Theory of Architecture

Time: 2 ½ Hrs   **Max Marks: 60**

PART- A (10X 1 = 10)

I. Answer <u>all</u> questions.

1.
2.
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PART – B (2x10= 50)

II. Answer <u>any two</u> questions.

(Question may have two subdivisions with equal marks)

11.

12.

13.

14.

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COMPARISON OF SYLLABUS

S.No.	H Scheme (2024)		G-Scheme(2022)		E- Scheme (2017)	
	Course Code	Course Name	Course Code	Course Name	Course Code	Course Name
1.	BEH101	Tamil Marabu				
2.	BEH201	Tamil and Technology				
3.	BEH171	Communicative English-I	BEG101	Communicative English-I	BEE101	Communicative English-I
4.			*BEG178 BEG278	Communication Skills Practical	BEE184	Communication Skills Practical
5.	BEG271	Communicative English-II	BEG201	Communicative English-II	BEE201	Communicative English-II
6.						
7.	BEH102	Engineering Mathematics	BEG 102	Engineering Mathematics-I	BEE 102	Engineering Mathematics-I
8.	BEH272	Applied Mathematics –II	BEG202	Engineering Mathematics-II	BEE202	Engineering Mathematics-II
9.	BEH273	Applied Mathematics – I				
10.					BEE203	Applied Mathematics
11.	BEH102	Engineering Physics	BEG103	Engineering Physics-I	BEE103	Engineering Physics-I
			BEG175	Engineering Physics Practical-I	BEE175	Engineering Physics Practical-I
12.	BEH274	Applied Physics – II	BEG203	Engineering Physics-II	BEE204	Engineering Physics-II
			BEG275	Engineering Physics Practical-II	BEE275	Engineering Physics Practical-II
13.	BEH275	Applied Physics – I	BEG203	Engineering Physics-II	BEE204	Engineering Physics-II
			BEG275	Engineering Physics Practical-II	BEE275	Engineering Physics Practical-II

14.	BEH104	Engineering Chemistry	BEG104	Engineering Chemistry-I	BEE104	Engineering Chemistry-I
			BEG176	Engineering Chemistry Practical-I	BEE176	Engineering Chemistry Practical-I
15.	BEH276	Applied Chemistry – II	BEG204	Engineering Chemistry-II	BEE205	Engineering Chemistry-II
			BEG276	Engineering Chemistry Practical-II	BEE276	Engineering Chemistry Practical-II
16.	BEH277	Applied Chemistry – I	BEG204	Engineering Chemistry-II	BEE205	Engineering Chemistry-II
			BEG276	Engineering Chemistry Practical-II	BEE276	Engineering Chemistry Practical-II
17.	BEH172	Basic Workshop Practices	BEG277	Basics of Industries and Workshop Practical	BEE177	Workshop Practice
18.	BEH173	Digital Workplace Skills	^BEG179 BEG279	Computer Application Practical	BEE178 & BEE277	Computer Application Practical (2014)
19.	BEH279	Drafting Practices	BEG105	Engineering Graphics-I	BEE105	Engineering Graphics-I
			BEG205	Engineering Graphics-II	BEE206	Engineering Graphics-II
20.	CEH201	Basics of Civil Engineering				
21.	BEH278	Basic Engineering Practices				
22.	ECH201	Basics of				

		Electronics Engineering				
23.	EEH201	Basics of Civil and Environmental Engineering				
24.	ICH201	Basics of Electronics and Instrumentation				
25.	ICH271	Basics of Electronics and Instrumentation Practical				
26.	GTH201	Basic of Textile Technology				
27.	GTH271	Apparel Machinery Engineering Practice				
28.	IDH201	Theory of Architecture				

Comparison Statement of G Scheme Syllabus and H Scheme Syllabus

H Scheme Subject	Unit	Added Topics	Removal Topics	Modified
Engineering Mathematics	I	Equality, addition, subtraction, scalar multiplication and multiplication of matrices	Properties of Determinants. Rank of a Matrix by determinant method. Statement of Binomial theorem for positive integral index- Applications of binomial theorem. Expansion of Binomial - Finding general term – Middle term – Coefficient of x^n and Term independent of x – Binomial Theorem for rational index up to - 3.	-
	II	Degree and Radian – Relation between degree and radian – Trigonometric ratios – Trigonometric ratios of standard angles–Graphs of sin x, cos x, tan x and e^x	Triple angle – Identities **Inverse Trigonometric Functions** Sum, difference and Product Identities- Inverse Trigonometric Functions – Principal value – Properties of Inverse Trigonometric functions.	The content of Unit III in the G Scheme has been incorporated as Unit II in the H Scheme.
	III	-	-	The unit of Complex Numbers in the G Scheme has been modified to Vector Algebra in the H Scheme.
	IV	-	-	The unit of **Differential calculus – I** in the G Scheme has been modified to **Statistics** in the H Scheme.
	V	-	-	The unit of **Differential calculus – II** in the G Scheme has been modified to **Probability** in the H Scheme.

H Scheme Subject	Unit	Added Topics	Removal Topics	Modified
Applied Mathematics I	I	**Theory** Equations of Tangents. **Practical** Basics of Geo Gebra	-	The contents of Unit I and Unit II in the H Scheme are derived from Unit I of the G Scheme.
	II	Practical corresponding to the theory is added.	1. Finding equation of Parabola, Hyperbola, Circle, Ellipse by using focus, directrix and eccentricity. 2. Vector Algebra (Unit-II)	
	III	**Theory** Limits of polynomials and rational functions – Limits of the form $\lim_{x \to 0} \frac{\sin ax}{bx}$ and $\lim_{x \to 0} \frac{\tan ax}{bx}$ (x in radians) (results only) – Definition of Continuity – Definition of differentiability – Differentiation formulae for standard functions – Differentiation of sum, difference, product and quotient of functions – Chain rule – Second order derivatives – Radius of curvature – Simple problems.		
	IV		1.Decomposition method 2.Integeration by substitution 3. Standard integrals 4. Integration by parts 5. Properties of definite integrals. 6.First order differential equation 7.Linear type differential equation	Units III, IV, and V in the G Scheme have been combined into Unit V in the H Scheme.
	V	**Theory** Random variables – Continuous random variables – Normal distribution – Process average and process variation using arithmetic mean and variance – Central line (CL), upper control limit (UCL) and lower control limit (LCL) – Control charts –$\bar{X}$ charts– Out of control signals – Simple problems.		

In all units, a practical component corresponding to the theory has been added.

H Scheme Subject	Unit	Added Topics	Removal Topics	Modified
Applied Mathematics II	I	***Practical** Basics of Geo Gebra	1.Circles – General equation of a circle – Diameter form of a circle- Concentric circles – Orthogonal circles (Condition only) – Contact of circles - Finding equation of Parabola, Hyperbola, Circle, Ellipse by using focus, directrix and eccentricity.	
	II			Vector Algebra in the G Scheme has been replaced by Inverse Trigonometric Functions in the H Scheme.
	III	**Theory** Definition of a complex number – Real and imaginary parts– Modulus and argument – Polar form of a complex number – Conjugate of a complex number – Representation of complex numbers on Argand plane –Addition, subtraction, multiplication and division of complex numbers – De-Moivre's theorem (without proof) - Simple problems.		
	IV	**Theory** Limits of polynomials and rational functions – Limits of the form $\lim_{x \to 0} \frac{\sin ax}{bx}$ and $\lim_{x \to 0} \frac{\tan ax}{bx} (x$ in radians) (results only) – Definition of Continuity - Definition of differentiability – Differentiation formulae for standard functions – Differentiation of sum, difference, product and quotient of functions – Chain rule – Second order derivatives – Simple problems.		
	V		Decomposition method- Integration by substitution-Standard integrals-Integration by parts-Properties of definite integrals- First order differential equation-Linear type differential equation	Units III, IV, and V in the G Scheme have been combined into Unit V in the H Scheme.

*In all units, a practical component corresponding to the theory has been added.

H Scheme Subject	Unit	Added Topics	Removal Topics	Remarks
Engineering Physics	I	Measurements: Need & limitations of measuring instruments, least count, types of measurement, – screw gauge – Vernier caliper - Applications into industries. Errors in measurement (systematic and random), Definition – absolute error, relative error (no derivation) – precautions to avoid systematic and random errors – Engineering applications.	*Dimensional formula for length, mass and time - derivation of dimensional formula for area, volume, density, velocity, momentum, acceleration, force, impulse, work or energy and power– Applications of the method of dimensional analysis. *Statics Scalar and vector quantities– Definitions and examples– Concurrent forces and coplanar forces–Definition- Resolution of a vector into two perpendicular components-Resultant and equilibrant–Definitions- Parallelogram law of forces statement-Expressions for magnitude and direction of the resultant of two forces acting at a point with an acute angle between them - Lami's theorem - Statement and explanation- Experimental verification of parallelogram law of forces and Lami's theorem. Simple problems based on expressions for magnitude and direction of resultant. *Moment of Force Moment of a force - Clockwise and anti-clockwise moments - Principle of moments – Couple –Torque acting due to a Couple – Experimental determination of mass of the given body using principle of moments.	Topics on Statics and Moment of Force in G Scheme is included in H Scheme Unit II
	II	**Statics** Scalar and vector quantities–Definitions and examples–Concurrent forces and coplanar forces– Definition- Resolution of a vector into two perpendicular components-Resultant and equilibrant– Definitions- Parallelogram law of forces statement-Expressions for magnitude	*Elastic and plastic bodies – Definition - stress, strain – Definitions – Hooke's law – statement - three types of strain – Elastic and plastic limit – Young's modulus, Bulk modulus, Rigidity modulus and Poisson's ratio – Definitions - Uniform and non-uniform bending of beams - Experimental determination of the Young's	Topics on Elasticity in G Scheme are included in Unit IV of H scheme.

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		and direction of the resultant of two forces acting at a point with an acute angle between them - Lami's theorem - Statement and explanation- Experimental verification of parallelogram law of forces and Lami's theorem. Simple problems based on expressions for magnitude and direction of resultant. *__Moment of Force__ Moment of a force - Clockwise and anti-clockwise moments - Principle of moments – Couple –Torque acting due to a Couple – Experimental determination of mass of the given body using principle of moments. *Triangle law of two forces	modulus of the material of a beam by uniform bending method – Poisson's ratio - Simple problems based on stress, strain and Young's modulus – Applications of elasticity. *Viscosity – Definition - Coefficient of viscosity - Definition, SI unit and dimensional formula - Stream line flow, turbulent flow - Explanation - Critical velocity – Reynolds number – Definition - Experimental comparison of coefficient of viscosity of two low viscous liquids – Terminal velocity – Definition – Experimental determination of coefficient of viscosity of a highly viscous liquid by Stokes method – Practical applications of viscosity – practical applications of Stoke's law. *Cohesive and adhesive forces - Definition - Surface tension & angle of contact – Definitions - Expression for surface tension of a liquid by capillary rise method - Practical applications of capillarity. Simple problems based on expression for surface tension - Applications of surface tension.	
	III	* working of a centrifuge device * Simple harmonic motion – amplitude –frequency – period – Simple pendulum – Acceleration due to gravity	Banking of curved paths – Angle of banking – Definition – Expression for the angle of banking of a curved path. { tanθ = v2/ (r g) }Simple problems based on the expressions for centripetal force and angle of banking. Application of centripetal and centrifugal force.	
	IV	Elastic and plastic bodies – stress-strain – definitions – Hooke's Law – three types of strain – stress-strain curve – elastic and plastic limit – Three modulus of elasticity and its relations (no derivation) – Uniform	* Rigid body–Definition-Moment of inertia of a particle about an axis, moment of inertia of a rigid body about an axis– expressions–Radius of gyration–Definition– Expression for the kinetic	

		and non-uniform bending of beams – Experimental determination of Young's modulus by uniform bending – Poisson ratio –Engineering applications of elasticity – I-shaped girders.	energy of a rotating rigid body about an axis–Angular momentum–Definition– Expression for the angular momentum of a rotating rigid body about an axis–Law of conservation of angular momentum–Examples. * Newton's laws of gravitation–Acceleration due to gravity on the surface of earth–Expression for variation of acceleration due to gravity with altitude * Satellites – Natural and artificial – Geostationary Satellites - Escape velocity and orbital velocity – Definitions– Expression for escape velocity and orbital velocity – Weightlessness - Uses of artificial satellites. Simple problems based on the expressions for escape velocity and orbital velocity.	
	V	Concept of heat – temperature – centigrade, Fahrenheit and Kelvin scales –conduction, convection – radiation – Good and bad thermal conductors – Properties of thermal radiation – Heat conversion – Specific heat capacity – Laws of thermodynamics – different types of process – Examples – Ideal gas– Boyle's Law.	* Wave motion–Introduction and definition–Audible range – Infrasonic - Ultrasonic's Progressive waves, longitudinal and transverse waves – Examples - Amplitude, wave length, period and frequency of wave – Definitions – Relation between wavelength, frequency and velocity of a wave - Stationary or standing waves. Vibrations - Free & forced vibrations and resonance – definitions and examples – Laws of transverse vibrations of a stretched string – Sonometer – Experimental determination of frequency of a tuning fork. *Acoustics of buildings – Echo -Reverberation, reverberation time, Sabine's formula for reverberation time (no derivation) – Coefficient of absorption of sound energy–Noise pollution. Simple problems	

based on expression for frequency of vibration. Doppler effect - Definition and application - Ultrasonics and its uses - SONAR.

*Pole strength –Definitions– Magnetic moment, intensity of magnetisation, magnetising field intensity, magnetic induction, permeability, hysteresis, saturation, retentivity and coercivity – Definitions - Method of drawing hysteresis loop of a specimen using a solenoid–Uses of Hysteresis loop simple problem based on intensity of magnetization – types of magnetic materials and their applications.

Experiments Added	Experiments Removed	Remarks
*Simple Pendulum Determination of acceleration due to gravity using simple pendulum	*Comparison of Viscosities To compare the co-efficient of viscosities of two low viscous Liquids by capillary flow Method.	Verification of parallelogram and Lami's theorem for concurrent forces are combined together as one experiment.
*Young's Modulus: Determination of young's modulus of a given object by telescope method.	*Stokes' Method To determine the coefficient of viscosity of a high viscous liquid.	
Helical Spring: Verification of Hooke's law and determination of Spring constant of helical spring	Sonometer To determine the frequency of the given tuning fork using a sonometer.	
Bimetallic Strip: To observe and explain the effect of heating on a bimetallic strip		

Unit	Subject	Removed	Added	Remarks
I	**Applied Physics I**	*Concept of Heat and Temperature - Centigrade, Fahrenheit and Kelvin scales of temperature measurement-Conduction, convection and radiation - Definitions and explanations-Good and poor conductors –Examples. Coefficient of thermal conductivity-Definition and SI unit--Properties of thermal radiation-Heat conversions.

*Postulates –Mean square velocity and Root Mean Square (RMS) velocity of molecules- | Rigid boy – Centre of mass – Centre of gravity – Examples – Torque-Moment of inertia of a rigid body about an axis – Expression – radius of gyration – Moment of inertia of symmetric objects (thin rod, disc, ring, hollow and solid cylinder) –parallel and perpendicular axis theorem (no derivation)- Examples. Fluids – streamline flow, turbulent flow – critical velocity –Surface tension – application of capillary – Viscosity -Definition and SI units-Coefficient of Viscosity – Reynolds number. | Units III, IV & V in G Scheme are removed in H Scheme |
| | **Applied Physics II** | Definitions and expressions – Expression for the pressure of a gas on the basis of postulates of kinetic theory of gases - Relation between pressure and kinetic energy of gas-Relation between kinetic energy and absolute temperature of the gas– Simple problems based on the expression for the pressure of a gas.

*Specific heat capacity of a substance (solids and liquids) – Definition – Specific heat capacity of a gas at constant volume – Specific heat capacity of a gas at constant pressure– Ratio of specific heat capacities – Explanation for C_p is greater than C_v – Derivation of Mayer's relation – calculation of Universal gas constant R from the gas equation PV= RT. Simple problems based on Mayer's relation. | Wave motion – audible range – infrasonic and ultrasonic – longitudinal, transverse and progressive waves – standing waves – free and forced vibration– acoustics of buildings – echo – reverberation – reverberation time – Sabine formula (no derivation) – Noise pollution – Doppler effect – applications. Reflection – Refraction – laws of reflection and refraction – refractive index of a medium – Total internal reflection – fiber optics –applications – Laser – Principle– applications – point lasers – remote sensing – RADAR – principle and applications – Sensors – Basics – various types – applications – Optoelectronic devices. | |

II	Applied Physics I	*First law of thermodynamics − Statement - Isothermal and Adiabatic changes - Explanation - Equations for isothermal and adiabatic changes (No derivation)Simple problems based on equations P1V1 = P2V2 and P1V1γ = P2V2γ Second law of thermodynamics −Clausius statement and Kelvin's statement− Working of Carnot's reversible engine with indicator diagram and its efficiency. Applications of heat and thermodynamics.	Wave motion − audible range − infrasonic and ultrasonic − longitudinal, transverse and progressive waves − standing waves − free and forced vibration − laws of transverse vibration − acoustics of buildings − echo − reverberation − reverberation time − Sabine formula (no derivation) − Noise pollution - Doppler effect − applications. Current − Voltage - Ohm's law − resistance − resistivity − effective resistance − Kirchhoff current and voltage law − Wheatstone bridge − Joule's law of heating − applications of heating effect of electric current. Energy bands in conductor, semiconductor and insulator, chemical bonds in semiconductor, Intrinsic and extrinsic semiconductors, PN Junction Diode	
	Applied Physics II	*Critical temperature, critical pressure and critical volume − Definitions − Principle used in cascade process − Cascade process of liquefaction of oxygen −Disadvantages of cascade process - Joule Thomson effect − Temperature of inversion − Liquefaction of air by Linde's process. *Introduction − Non-renewable and Renewable (Alternate) energy sources − Examples − Solar energy, wind energy, Tidal energy − Advantages and disadvantages of renewable energy.	Current − Voltage − Ohm's law − resistance − resistivity - effective resistance -Kirchhoff current and voltage law − Internal resistance of the cell − Joule's law of heating − applications of heating effect of electric current− Faraday law of electromagnetic induction − Inductor − self & mutual Inductance − applications− bar magnets − Pole strength − Magnetic moment − intensity of magnetization− magnetic field − types of magnetic materials and applications. Energy bands in conductor, semiconductor and insulator, chemical bonds in semiconductor, Intrinsic and extrinsic semiconductors, PN Junction Diode.	

Subject	Experiments Added	Experiments Removed
	Determination of moment of inertia of disc using torsional pendulum.	**Refractive Index** To determine the refractive index of a transparent liquid (water) using travelling Microscope.
Applied Physics - I	Comparison of co-efficient of viscosity of two viscous liquids by Poiseuille's method.	**Spectrometer** To determine the angle of the prism using spectrometer.

	Mini Projects based on 1. Center of gravity 2. Fluid flow – streamline and turbulent 3. Surface tension 4. Viscosity 5. Resonance 6. Echo, reverberation, and acoustics 7. Electrical circuits 8. Semiconductors and PN junction diodes	**Copper Voltameter** To determine the electro chemical equivalent (e.c.e.) of copper, using copper voltameter.
		Solar Cell To draw the V – I characteristics curve for the given solar cell.
		Galvanometer into Ammeter To convert the given Galvanometer (of known resistance) into an ammeter of desired range and to verify the same.
		Laws of Resistances To verify the laws of resistances by connecting the two given standard Resistances (i) in series and (ii) in parallel, using Ohm's law.

Subject	Experiments Added	Experiments Removed
Applied Physics - II	Determination of frequency of tuning fork using sonometer	**Refractive Index** To determine the refractive index of a transparent liquid (water) using travelling Microscope.
	Mini Projects based on 1. Resonance 2. Echo, reverberation, and acoustics 3. Fiber optics 4. LASER 5. Sensors 6. Electrical circuits 7. Faraday's Law of Electromagnetic induction 8. Semiconductors and PN junction diodes	**Spectrometer** To determine the angle of the prism using spectrometer.
		Copper Voltameter To determine the electro chemical equivalent (e.c.e.) of copper, using copper voltameter.
		Galvanometer into Ammeter To convert the given Galvanometer (of known resistance) into an ammeter of desired range and to verify the same.
		Laws of Resistances To verify the laws of resistances by connecting the two given standard Resistances (i) in series and (ii) in parallel, using Ohm's law.

Subject	Unit	Added Topics (Theory & Practical - Experiments) - (H scheme)	Removal Topics (Theory) - (G scheme)	Removal Topics (Practical - Experiments)(G scheme)
Engineering Chemistry	I	**Theory:** Solution –Solute, Solvent - dilute and concentrated solution – methods of expressing the concentration of the solution – molality – molarity – normality (simple numerical problems only). **Practical (Experiments):** 1.Estimation of sulphuric acid 2.Estimation of strong acid by pH metry	**Atomic Structure and Chemical Bonding:** Fundamental particles – proton – electron – neutron – atomic number – mass number – extra nuclear part – filling up of electrons – aufbau principle –s–p–d– f orbitals – electronic configuration – definition of atomic mass, molecular mass, equivalent mass, valency (definitions only) – octet rule – electrovalent bond – sodium chloride formation – covalent bond – formation of ammonia **Periodic Table:** Modern periodic law – periodic classification of elements – features of modern periodic table – properties of s–p–d–f block elements. **Acids and Bases:** Definition of Acid and Base– pH and pOH (Numerical problems)	1. Estimation of weak base (sodium carbonate) using a standard solution of sodium hydroxide and sulphuric acid as solution. 2. Estimation of strong base (sodium hydroxide) using a standard solution of sodium carbonate and sulphuric acid as link solution. 3. Comparison of strengths of two acid solutions using a standard solution of sodium hydroxide 4. Comparison of strengths of two alkaline solutions using a standard solution of oxalic acid 5. Estimation of Iron in ferrous sulphate solution using a standard solution of ferrous ammonium sulphate and potassium permanganate as link solution.
	II	**Theory:** -Nil- **Practical (Experiments):** 3.Preparation of lyophilic colloids and lyophobic colloids	**Colloids:** Lyophilic and Lyophobic colloids (Differences) – Properties – Electrophoresis and Coagulation – Industrial applications of colloids – Cleansing action of soap, Sewage disposal – tanning – and artificial rain. **Nanotechnology:** Nano particles – definition – properties – application of Nanotechnology – Engineering – medicine – biomaterial. **Catalysis:** Promoter – Catalyst poison – active centre – Definition	6. Estimation of total hardness of a water sample using EDTA. 7. Determination of pH using a pH meter and calculation of hydrogen ion Concentrations in the solutions (For five given samples).
	III	**Theory:** **G scheme unit V topics shifted to H scheme unit III:** Plastics – types – Thermoplastics and Thermo set plastics – Differences –	**Minerals and Metallurgy:**Terminology in metallurgy- Mineral(definition) – Minerals of Tamilnadu – Sources and Uses (Basic concepts only) – Extraction of iron – Blast	

		Mechanical properties of plastics–Natural polymer–Rubber –defects of natural rubber–Vulcanization–Compounding of rubber–Ingredients and their functions. **Added topics:**Types of Polymerization–Addition and condensation polymerization– Advantages of plastics over traditional materials–Extraction of rubber from latex. **Practical (Experiments):** 4. Preparation of thermo setting resin-Urea-form aldehyde resins	furnace – cast iron – steel manufacture – Bessemer converter – heat treatment of steel – hardening – annealing – tempering. **Metallurgy of Tungsten and Titanium**: Extraction and uses of Tungsten and Titanium. **Powder Metallurgy:** Definition – Powder metallurgical process – Preparation of Metal Powder – Atomization – Reduction of Metal Oxide – blending – compacting – sintering – finishing – Applications of Powder Metallurgy.
	IV	**Theory:** Electronic concept of oxidation and reduction–electrolytes -classification-strong, weak and non-electrolyte – examples – electrolysis – definition – Mechanism – Industrial applications of Electrolysis - Chrome plating - Primary Battery – SecondaryBattery–Definition, examples & construction of Li-ion Battery. Corrosion (Definition)–Differential aeration theory only – Factors Influencing Rate of Corrosion.–Methods of Prevention of Corrosion (qualitative).	**Cement and Ceramics:** Definition – Manufacture of Portland Cement – Wet Process – Setting of Cement (No equation) – Ceramics – White pottery – Definition – Manufacture of White pottery – Uses – Definition of glazing – purpose – Method – Salt glazing – liquid glazing. **Refractories and Glass:** Definition – requirements of a good refractory – types with examples and uses – uses of silica, fire clay and alumina. Composition of Glass – Manufacture of Glass – annealing of glass – varieties of glass – Optical glass, wind shield glass and Photo chromatic glass. **Everyday Chemistry:** Basic compostion, applications, health aspects and pollution impacts of soaps and detergents, vinegar, insects repellents, soft drinks, activated charcoal.
	V	**Theory:** Air pollution–Definition–Air pollutants (SO_2, H_2S, HF, CO and Dust)–Sources and Harmful effects – Formation of Acid Rain – Harmful effects – Green House Effect–Causes–Ozone layer depletion and its harmful	**Polymer:** Polymers in Surgery – Biomaterials – Definition – Biomedical uses of Polyurethane, PVC, Polypropylene and Polyethylene. **Abrasive:** Definition – classification –

| | | effects - Global warming – Harmful effects – Control of Air Pollution. Solid Waste – Definition – Problems – Types of Solid waste methods of Disposal – Land fill and Incineration – Recycling – Definition – Examples–Advantages of Recycling (Basic ideas) Green 6 Chemistry Definition–Goals of Green Chemistry.
Practical (Experiments):
7.Crystallization of copper sulphate and identification of ions.
8.Decolorization of clayey water usings and bed. | hardness in Moh's scale – Natural abrasives – Diamond, Corundum, Emery and Garnet. Synthetic abrasives – Carborundum – Boroncarbide manufacture – properties and uses.
Composite   Materials: Definition – examples – Classification of composites – Advantages over metals and polymers – General application | |

Subject	Unit	Added Topics (Theory & Practical - Experiments) – (H scheme)	Removal Topics (Theory) (G scheme)	Removal Topics (Practical - Experiments) – (G scheme)
Applied Chemistry I	I	**Theory:** **G scheme unit IV topics shifted to H scheme unit I:** Sources of water – depletion of underground water – Reasons – Basic Idea of rain water harvesting - Hard water and soft water – Hardness of water – Carbonate and Non–carbonate hardness – Methods of expressing hardness – mg/lit and ppm – Estimation of total hardness by EDTA method – simple Problems on total hardness only- Disadvantages of using hard water in boilers – Scale formation, Corrosion of boiler metal, Caustic Embrittlement– Priming and Foaming (definition only). **Practical (Experiments):** 1. Estimation of total hardness of water by EDTA method. 2. Determination of alkalinity of sample of hard water. 3. Estimation of residual chlorine in a given water sample. 4. Estimation of oxalic acid by permanganometry.	**Electrochemistry-I:** Electronic concept of oxidation and reduction – Faradays' laws of electrolysis – simple problems – electrolytes - nonelectrolytes – electrolysis – definition – Mechanism – Industrial applications of Electrolysis – electroplating – chromeplating.**Electrochemical cell:** Electrochemical cell – Definition Galvanic cell – Formation of Daniel cell – Electrochemical series – Definition – significance – Representation of cell. **Energy Sources:** Primary Battery – Secondary Battery – Definition and example – cell – Construction, working principle and Uses of Lead acid – Storage battery – Lithium ion – battery - Solar Cell – Definition – working principle.	**I. Analysis of Inorganic simple salt (QUALITATIVE ANALYSIS):** Analysis of eight inorganic simple salts containing any one acid radical and basic radical. (*Acid Radicals: Carbonate, Chloride, Nitrate and Sulphate.Basic Radicals:* **Lead, Copper, Aluminium, Zinc, Barium, Calcium, Magnesium and Ammonium)** **II.Analysis of Effluent containingLead, Cadmium, Copper and Zinc** metal ions (EFFLUENT ANALYSIS).

| | | II | **Theory:**
G scheme unit IV topics shifted to H scheme unit II:
Softening of hard water – Ion-Exchange method and Reverse Osmosis method – Municipal supply – purification of drinking water – Quality of potable water (WHO standard)
Added topics:
Determination of residual chlorine in the given sample of hard water–identification of sulphate and chloride ions–identification of heavy metal ions in the given sample of effluent –Calculation of pH, H+ ions and TDS of different samples of acid and base.
Practical (Experiments):
5. Calculation of pH, H+ ion and TDS of different samples.
6. Estimation of copper by Complexometry.
7. Effluent analysis of heavy metalions-lead, copper & zinc.
8. Systematic analysis of acid radicals such as carbonate, nitrate and sulphate ions. | **Corrosion:**
Definition – types of corrosion – theories of corrosion – galvanic cell formation theory – differential aeration theory – factors influencing rate of corrosion.
Methods of Prevention of corrosion:
Galvanization – tinning – anodisation – cathodic protection – sacrificial anode method and impressed voltage method.
Organic Coatings:
Paint – definition – Components of paints – Varnish – definition – Preparation of oil varnish – differences between paint and varnish – Special Paints – Luminescent paint, fire retardant paint, Aluminum paint and distemper. | |
| | | III | | **Fuels:**
Fuel – Definition – Calorific value – calorie – Liquid fuels – liquid hydrogen – power alcohol – uses – Refining of Petroleum – Fractional distillation – Cracking (Concept only) – Gaseous fuels – Preparation, composition and specific uses of Producer gas and Water gas – Composition and uses of CNG and LPG – advantages of gaseous fuels.
Combustion:
Definition – Combustion calculation by mass (for solid and liquid fuels) – Stoichiometric calculations – Volume of air required – Definition of Flue gas – Flue gas Analysis – Orsat Apparatus – Simple numerical problems.
Rocket Propellants:
Definition – characteristics – Classification of propellants – brief idea of solid and liquid propellants. | |

	IV		Rain water harvesting (advantages) − parameters of potable water − pH − TDS − residual Chlorine permissible limits − determination of ecoli (preliminary idea).	
	V		**ir Pollution:** Pollution and Air pollution − Definition − Air pollutants (SO2, H2S, HF, CO and Dust) − Sources and Harmful effects − smog and types of smog − Formation of Acid Rain − Harmful effects − Green House Effect − Causes − Global warming − Harmful effects − Ozone Layer − Importance − Causes for Depletion of Ozone Layer (No equations) − Harmful effects of Ozone Layer Depletion − Control of Air Pollution. **Water Pollution:** Causes of Water Pollution − Sewage, Effluents, Algae and Microorganisms − Harmful effects − Definition − Sewage − Sewerage − Disposal − Industrial Effluents − Harmful effects of Effluents Treatment of Effluents − Eutrophication − definition − harmful effects. **Solid Waste Management:** Solid Waste − Definition − Problems − Types of Solid Waste − Methods of Disposal − Land fill and Incineration − Recycling − Definition − Examples − Advantages of Recycling (Basic ideas) Green Chemistry Definition − Goals of Green Chemistry (Basic ideas).	

Subject	Unit	Added Topics (Theory & Practical - Experiments) – (H scheme)	Removal Topics (Theory)– (G scheme)	Removal Topics (Practical - Experiments) – (G scheme)
Applied Chemistry II	I	**Theory:** **G scheme unit IV topics shifted to H scheme unit I:** Sources of water – depletion of underground water – Reasons – Basic Idea of rain water harvesting - Hard water and soft water – Hardness of water – Carbonate and Non–carbonate hardness – Methods of expressing hardness – mg/lit and ppm – Estimation of total hardness by EDTA method –simple Problems on total hardness only- Disadvantages of using hard water in boilers – Scale formation, Corrosion of boiler metal, Caustic Embrittlement– Priming and Foaming (definition only). **Practical (Experiments):** 1. Estimation of total hardness of water by EDTA method. 2. Determination of alkalinity of sample of hard water. 3. Estimation of residual chlorine in a given water sample. 4.Estimation of copper by Complexometry.	**Electrochemistry-I:** Electronic concept of oxidation and reduction – Faradays' laws of electrolysis – simple problems – electrolytes - nonelectrolytes – electrolysis – definition – Mechanism – Industrial applications of Electrolysis – electroplating – chromeplating.**Electrochemical cell:** Electrochemical cell – Definition Galvanic cell – Formation of Daniel cell – Electrochemical series – Definition – significance – Representation of cell. **Energy Sources:** Primary Battery – Secondary Battery – Definition and example – cell – Construction, working principle and Uses of Lead acid – Storage battery – Lithium ion – battery - Solar Cell – Definition – working principle.	**I. Analysis of Inorganic simple salt (QUALITATIVE ANALYSIS):** Analysis of eight inorganic simple salts containing any one acid radical and basic radical. (*Acid Radicals:* **Carbonate, Chloride, Nitrate and Sulphate.** *Basic Radicals:* **Lead, Copper, Aluminium, Zinc, Barium, Calcium, Magnesium and Ammonium)** **II.Analysis of Effluent containingLead, Cadmium, Copper and Zinc** metal ions (EFFLUENT ANALYSIS).
	II	**Theory:** **G scheme unit IV topics shifted to H scheme unit II:** Softening of hard water – Ion-Exchange method and Reverse Osmosis method – Municipal supply – purification of drinking water – Quality of potable water (WHO standard) **Added topics:** Determination of residual	**Corrosion:** Definition – types of corrosion – theories of corrosion – galvanic cell formation theory – differential aeration theory – factors influencing rate of corrosion. **Methods of Prevention of corrosion:** Galvanization – tinning – anodisation – cathodic protection – sacrificial anode method and impressed voltage	

		chlorine in the given sample of hard water– identification of sulphate and chloride ions– identification of heavy metal ions in the given sample of effluent – Calculation of pH, H+ ions and TDS of different samples of acid and base. **Practical (Experiments):** 5. Calculation of pH, H+ ion and TDS of different samples. 6.Effluent analysis of heavy metalions-lead, copper & zinc. 7.Process of electroplating/ copper plating using Copper Volta meter. 8. Systematic analysis of acid radicals such as carbonate, nitrate and sulphate ions.	method. **Organic Coatings:** Paint – definition – Components of paints – Varnish – definition – Preparation of oil varnish – differences between paint and varnish – Special Paints – Luminescent paint, fire retardant paint, Aluminum paint and distemper.	
	III		**Fuels:** Fuel – Definition – Calorific value – calorie – Liquid fuels – liquid hydrogen – power alcohol – uses – Refining of Petroleum – Fractional distillation – Cracking (Concept only) – Gaseous fuels – Preparation, composition and specific uses of Producer gas and Water gas – Composition and uses of CNG and LPG – advantages of gaseous fuels. **Combustion:** Definition – Combustion calculation by mass (for solid and liquid fuels) – Stoichiometric calculations – Volume of air required – Definition of Flue gas – Flue gas Analysis – Orsat Apparatus – Simple numerical problems. **Rocket Propellants:** Definition – characteristics – Classification of propellants –brief idea of solid and liquid propellants.	
	IV		Rain water harvesting (advantages) – parameters of potable water – pH – TDS –	

			residual Chlorine permissible limits – determination of ecoli (preliminary idea).	
	V		**Air Pollution:** Pollution and Air pollution – Definition – Air pollutants (SO_2, H_2S, HF, CO and Dust) – Sources and Harmful effects – smog and types of smog – Formation of Acid Rain – Harmful effects – Green House Effect – Causes – Global warming – Harmful effects – Ozone Layer – Importance – Causes for Depletion of Ozone Layer (No equations) – Harmful effects of Ozone Layer Depletion – Control of Air Pollution. **Water Pollution:** Causes of Water Pollution – Sewage, Effluents, Algae and Microorganisms – Harmful effects – Definition – Sewage – Sewerage – Disposal – Industrial Effluents – Harmful effects of Effluents Treatment of Effluents – Eutrophication – definition – harmful effects. **Solid Waste Management:** Solid Waste – Definition – Problems – Types of Solid Waste – Methods of Disposal – Land fill and Incineration – Recycling – Definition – Examples – Advantages of Recycling (Basic ideas) Green Chemistry Definition – Goals of Green Chemistry (Basic ideas).	

Subject	Unit	H Scheme	G Scheme	Comparison
Communicative English-I	I Grammar Essentials	Standard Grammar Topics (Assumed similar to G Scheme: Tenses, Parts of Speech, Questions, etc.)	Functional Grammar and Usage – Detailed coverage of grammar components	Similar content retained with minor restructuring
	II Basic Vocabulary Practice	Likely integrated with communication tasks (not separately listed)	Vocabulary Enrichment – Specific lists: Collocations, Homophones, Phrasal Verbs	Vocabulary section not distinctly presented in H Scheme
	III Communication English	Practical Dialogues, Day-to-day Conversations, Functional Writing	Situational English – Formal letters, Comprehension, e-communication	Retained with simplified title and integrated format
	IV Presentation-Oriented Writing	Likely includes real-life tasks like reports, reviews, presentations	Creative English – Advertisement, Review Writing, Visuals	Objectives continued but specific creativity tasks may be dropped
	V Literary Reading (Removed)	No literary texts mentioned in HScheme	Includes 4 literary texts by R.K. Narayan, Charles Lamb, Kamala Das, John Keats	Complete removal of literary component

Subject	Unit	H Scheme	G Scheme	Comparison
Communicative English-II	I Listening Skill	Auditory training: speeches, conversations, accents (British, American, Indian)	Same components: speeches, stories, cloze tasks with accents	Retained fully
	II Reading Skill	Pronunciation, Intonation, Tongue Twisters, Newspaper Scanning	Identical focus on reading fluency and pronunciation	Retained fully
	III Speaking Skill	Polite expressions, Self-intro, Quotes, JAM, Conversation	Same tasks: introduction, polite usage, JAM, quotes	Retained fully
	IV Writing Skill	Thought fillers, Story Completion, PPT Prep, Non-verbal Communication, Process Description	Same writing modules with identical task sets	Retained fully

Retained in H Scheme	Removed from H Scheme	Modified
All practical components in Semester II (Listening, Speaking, Reading, Writing)	Entire literary component from Semester I	Grammar and communication units retained but restructured and simplified
Communication-focused tasks from Semester I	Explicit creative writing and vocabulary building units	Vocabulary and creative tasks possibly merged or streamlined

Comparison Statement of Dote R2023 Scheme Syllabus and H Scheme Syllabus

S. No.	H SCHEME Subject	Addition	Deletion	Modification	UNIT
1	Tamil Marabu	-	-	-	
2	Engineering Mathematics	Median, Mode	-	-	III
3	Engineering Physics	Convention to be followed in SI units I-Shaped Girders Ex. No. 8 To observe and explain the effect of heating on a bimetallic strip	- Ex. No. 8 Verification of Boyle's law using Quill Tube	-	I IV V
4	Engineering Chemistry	-	-	-	
5	Communicative English I	The seed of Truth Networking skills Passage on Generative AI	-	-	III IV V
6	Digital Workplace Skills	-	-	-	-
7	Tamil and Technology	-	-	-	-
8	Communicative English – II	-	-	-	-
9	Basic Engineering Practices	-	-	-	-

10	Basic Workshop Practices	**Ex.No2** Drilling, Counter sinking, Counter boring. **Ex.No**5. Draw the circuit diagram and connect the Fan regulator switch and Fluorescent lamp controlled by switch. **Ex.No**8. Plumbing – Cutting and External Threading of GI pipes using Die set	-	-	Practical
10	Applied Mathematics – I	Equations of tangents to circle Continuity	-	Exercise-2 changed.	I III
11	Applied Chemistry – I	-	-	-	-
12	Drafting Practices	Numbering, important dimensioning rules. X line,fillet, chamfer	-	-	I III
12	Basics of Civil Engineering	-	-	-	-
13	Basics of Civil and Environmental Engineering	-	-	-	-
14	Basic of Textile Technology	-	-	-	-
15	Theory of Architecture	-	-	-	-

16	Apparel Machinery Engineering Practice	-	-	-	-
17	Basic Design & Visual Arts	-	-	-	-
18	Architectural Drawing - I	-	-	-	-
19	Basics of Computer Engineering	-	-	-	-
20	Basics of Electronics Engineering	-	-	-	-
21	Basics of Electronics and Instrumentation	-	-	-	-
22	Applied Mathematics–II	Definition of sinusoidal function-Finding maximum value, minimum value, amplitude, period and phase shift Maxima, Minima Continuity	Maxima, Minima	-	II III IV
23	Applied Chemistry -II	-	-	-	-
24	Basics of Electronics and Instrumentation Practical	-	-	-	-

25		**Theory**			
	Applied Physics – I	Energy bands in conductor, semiconductor and insulator, chemical bonds in semiconductor, Intrinsic and extrinsic semiconductors, PN Junction Diode.	-	**-**	II
			Determination of moment of inertia of rigid rod about center of mass - compound pendulum		I
		Practical Comparison of co-efficient of viscosity of two viscous liquids by Poiseuille's method.	Determination of Surface tension of a liquid by Capillary rise method.		
			Determination of coefficient of Viscosity of highly viscous liquid by Stokes method.		II
		Find the output conditions for different combinations of the input for N NOT gate and 2 inputs AND, OR, NAND & NOR logic gates using IC chips. Determination of Forward bias of a PN Junction Diode.	Determination of frequency of tuning fork using Sonometer. Determination of resistance & resistivity of a given coil using Wheatstone bridge. Verification of laws of resistance - Ohm's law	The number of experiments has been reduced from 8 to 4, and mini-projects have been introduced as a new component.	
		262	Determination of specific heat capacity of a liquid using Joule's		

26		**Theory**			
	Applied Physics –II	Energy bands in conductor, semiconductor and insulator, chemical bonds in semiconductor, Intrinsic and extrinsic semiconductors, PN Junction Diode.	-		II
			Determination of Refractive index of the glass plate using pin and paper		I
		Practical			
		Draw the VICharacteristics of solar cell.	Determination of Refractive index of water using travelling microscope.		II
			Verification of laws of resistance - Ohm's law.		
		Find the output conditions for different combinations of the input for N NOT gate and 2 inputs AND, OR, NAND & NOR logic gates using IC chips.	Determination of the internal resistance of the cell using potentiometer.		
		Determination of Forward bias of a PN Junction Diode.	Experimental determination of specific heat capacity of a liquid using Joule's calorimeter.		
			Comparison of magnetic moments of two small bar magnets - deflection magnetometer Tan A position by equal distance method		
		263			

25	Applied Physics – II	**Semiconductor**: Energy bands in conductor, semiconductor and insulator, Chemical bonds in semiconductor, Instrinsic and extrinsic semiconductors, PN junction diode		Sonometer	I
		Electricity & Magnetism Simple LED circuit. Earth quake alarm Pulse oximeter Switch board Fire alarm **Optics** Solar panel Prism Rainbow Pinhole camera **Waves & Sound** Guitar string vibrations. Doppler effect using sound source Resonance using glass, water and spoon			II
				Practical converted to project.	Project