DIPLOMA

IN

CIVIL ENGINEERING

SYLLABUS

H- SCHEME

WITH EFFECT FROM JUNE 2025

175, DR. DHARMAMBAL GOVERNMENT POLYTECHNIC COLLEGE FOR WOMEN (AUTONOMOUS), THARAMANI, CHENNAI

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

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

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

iii. **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.

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

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

vi. **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.

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

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1. Preamble

Dr. 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 labour-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

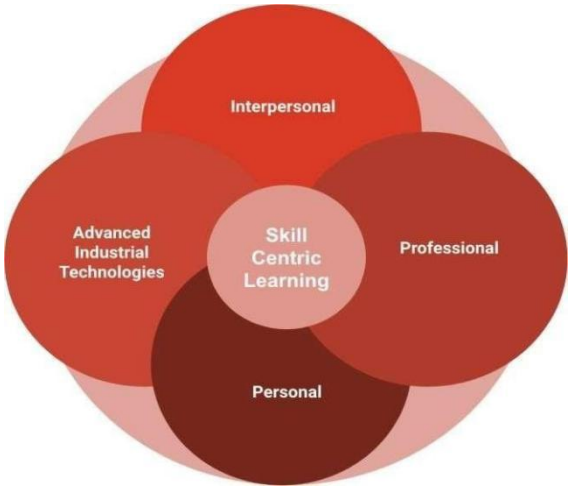
Today's world is rapidly changing and increasingly interconnected, and the future talent pipeline to be sourced from the campuses needs to adapt to changes that will keep accelerating in the future. The new diploma programme focuses on equipping learners with skills that will enable them to cope with 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 is 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 for successful completion. Capstone Project may be offered in phases, 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) -** 3 to 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
Audit course	0

Integrated Learning Experiences	
Induction Programme	Non-Credit Course
I&E / Club Activity / Community Initiatives	Non-Credit Course
Shop Floor Immersion	Non-Credit Course
Student-Led Initiative	Non-Credit Course
Special Interest Groups (Placement Training)	Non-Credit Course
Emerging Technology Seminars	Non-Credit 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. **Health & Wellness:** This aims to teach students about various aspects of health and fitness, including exercise, nutrition, yoga, mental health, and substance awareness.

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

9. **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 dipolma programme 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 core/ 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 the Institution / 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. Induction Programme
6. Special Interest Groups
7. Club Activity
8. Community Initiatives
9. Emerging Technology Seminars
10. Student Led Initiative
11. 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) - 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 (f) - 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 (g) - 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 (h) - 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 (i) - 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 (j) - 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.(k) - 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 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 the 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.
- Table for theory papers and practicum papers with end exam theory.

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) ->10Marks 10 Mark Questions (2out of 4) ->20 Marks	15 Marks
CAT 2	2 Periods	UNITS III & IV	30 Marks 1 Mark Questions (10) ->10Marks 10 Mark Questions (2out of 4) ->20 Marks	15 Marks
CAT 3 (OR) SEMINAR	1 Period	UNIT V	15 1 Mark Questions (5) -> 5Marks 10 Mark Questions (1out of 2) ->10Marks	10 Marks
	During the semester	Subject/General		
Total				40 Marks

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) ->10Marks 10 Mark Questions (2out 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) ->10Marks 10 Mark Questions (2out of 4) ->20 Marks	15 Marks
		UNITS III & IV and Activity	30 Marks Theory ->18 Marks Activity ->12 Marks	
PRACTICALS (OR) CAT 3	2 Periods	All Experiments	60 Marks	10 Marks
	1 Period	UNIT V And Activity	15 Marks Theory ->10 Marks Activity ->5 Marks	
Total				40 Marks

- For practical papers and practicum papers with end exam practicals, continuous assessment shall be carried out for 40 marks. Each department is given flexibility to determine and implement its own assessment pattern for 40 marks based on the nature and requirements of their respective courses.

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

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

- The End Semester Examination will be conducted for 60 marks.
- The End Semester Examinations (Theory, Practical, Project) will be conducted for a duration of 150 minutes.
- 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. The 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 (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	Examiners:20	Examiners:20	Examiners: 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 practical subjects.

- No Minimum marks for continuous assessment (Internal).

- If a student fails to secure a pass in a theory course / laboratory course / 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)	-	-
AB (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.

"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 in the Grade 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 is 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.

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

where, C_i is the number of Credits assigned to the course, GP_i is the point corresponding to the grade obtained for each course and 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 POLYTECHNIC COLLEGE FOR WOMEN

THARAMANI, CHENNAI-113.

(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF CIVIL ENGINEERING

H-SCHEME SYLLABUS

MEMBERS PRESENT IN THE DEPARTMENT MEETING HELD ON 17.08.2024

1. **M. KALAISELVI M.E.,**
   HOD / Civil,
   Dr.DGPCW,
   Tharamani, Chennai-113.

2. **Dr. A. LEENA PAULINE**
   Lecturer/Civil,
   Dr.DGPCW,
   Tharamani, Chennai-113.

3. **R. CHITRALEKHA B.E.,**
   Lecturer / Civil,
   Dr.DGPCW,
   Tharamani, Chennai-113.

4. **M. DHARANI B.E.,**
   Lecturer / Civil,
   Dr.DGPCW,
   Tharamani, Chennai-113.

5. **R. KAVINMATHY M.E.,**
   Lecturer/ Civil,
   Dr.DGPCW,
   Tharamani, Chennai-113.

6. **R. KRISHNAMOORTHY M. TECH**
   Lecturer / Civil,
   Dr.DGPCW,
   Tharamani, Chennai-113.

NON TEACHNING MEMBERS

1. **V. SIVAMAYAM**
   Skilled Assistant / Civil
   Dr.DGPCW,
   Tharamani, Chennai-113.

2. **K. VIJAYARAJAN**
   Skilled Assistant / Civil
   Dr.DGPCW,
   Tharamani, Chennai-113.

MEMBERS PRESENT IN THE DISCIPLINE WISE TASK FORCE MEETING HELD ON 30.08.2024

1. **M. KALAISELVI M.E.,**
   HOD / Civil

   Dr.DGPCW, Tharamani,
   Chennai-113.

2. **E. SENTHILKUMAR,**
   Assistant professor,
   Meenakshi college of Engineering, Chennai - 127.

3. **J. PRASHANTH,**
   PROPRIETIOR,
   Weaverbird
   Construction.

4. **DR. R. BALARAMAN,**
   Assistant professor,
   Jenusalem engineering college,
   Chennai - 100.

5. **N. PARTHIPAN**
   Quantity surveyor,
   Mukesh and associate,
   Madhavaram,

6. **R. KAVINMATHY**
   Lecturer / Civil
   Dr.DGPCW,
   Tharamani, Chennai-113.

7. **B. SINDUJA**
   Deputy highway engineer,
   Lea Associates South Asia Pvt, Ltd,
   Adyar,

8. **AARTHY**
   Estimation
   No:108, 3rd street
   Lakshmi Nagar, Chrompet

9. **R. KRISHNAMOORTHY**
   Lecturer/ Civil,
   Dr.DGPCW,
   Tharamani, Chennai-113.

MEMBERS PRESENT IN THE APEX BODY MEETING HELD ON 07.02.2025

1. **R KEERTHANA,**
   Assistant professor,
   Tagore engineering college,
   Chennai - 127.

2. **R. KRISHNAMOORTHY, M.TECH.,**
   Lecturer/ Civil,
   Dr.DGPCW, chennai 113.

3. **M. SELINKUSHPITHA**
   Assistant engineer,
   TNPCB.

4. **KARTHICK VENKATESH, M.E**
   Senior Engineer

5. **K. JANARTHANAN**
   Construction
   Palamalainathapuram.
   Ariyalur.

6. **M.SANTHIYA**
   REBAR DETAILING & ESTIMATION
   ER MST Rebar Services Private Ltd
   Shanthi Nagar, Chennai – 44

7. **S. RADHIKA**
   Technip Energies,
   Velachery, Guindy,
   Chennai-32

8. **R. KRISHNAMOORTHY**
   Lecturer/ Civil
   Dr.DGPCW, Tharamani,
   Chennai-113

9. **M. DHARANI**
   Lecturer/ Civil
   Dr.DGPCW, Tharamani,
   Chennai-113

Diploma in Civil Engineering

Program Outcomes (PO's)

POs are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability, attitude, and behavior that students acquire through the program.

The POs essentially indicate what the students can do from subject-wise knowledge acquired by them during the program. As such, POs define the professional profile of an engineering diploma graduate.

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 an 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 the context of society, sustainability, environment and ethical practices.

PO6: Project Management: Use engineering management principles individually, as a team member or as 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.

Program Specific Outcomes (PSO's)

PSOs are statements that describe what diploma students are expected to achieve specifically within their field of study by the end of the program. These outcomes focus on the application of subject-specific knowledge, practical skills, and technical competencies acquired throughout the curriculum.

PSOs essentially reflect the specialized abilities that enable students to perform specific tasks and solve real-world problems related to their discipline. As such, PSOs define the technical expertise and job-specific profile of a diploma graduate in a particular branch of engineering.

For the Diploma in Civil Engineering program, the following PSOs are defined:

PSO1: Field Application and Technical Competence

Apply fundamental knowledge and technical skills in surveying, construction, structural analysis, and materials testing to solve real-world civil engineering problems through effective planning, design, execution, and maintenance of infrastructure projects.

PSO2: Professional Practice and Lifelong Learning

Demonstrate professionalism, teamwork, ethical responsibility, and commitment to safety in civil engineering practices, while adapting to evolving technologies and engaging in lifelong learning for sustainable development.

Program Educational Objectives (PEO's)

PEOs are broad statements that describe the career and professional accomplishments that graduates of the Diploma in Civil Engineering program are expected to achieve within three to five years of graduation. These objectives focus on applying the technical knowledge, practical skills, and professional competencies gained during the program to real-world civil engineering contexts.

PEO1: Professional Practice

Graduates will apply core civil engineering principles, techniques, and modern tools to plan, design, execute, and manage infrastructure projects effectively and safely.

PEO2: Lifelong Learning & Adaptability

Graduates will engage in continuous professional development, keeping pace with evolving technologies, codes, and best practices in civil engineering and allied fields.

PEO3: Communication & Teamwork

Graduates will demonstrate strong interpersonal, leadership, and communication skills to collaborate effectively in multidisciplinary teams and with diverse stakeholders.

PEO4: Ethics, Sustainability & Social Responsibility

Graduates will uphold professional ethics, prioritize environmental sustainability, and contribute responsibly to society by incorporating sustainable and resilient practices in their engineering solutions.

Diploma in Civil Engineering

Credit Distribution

Semester	No of Courses	Periods	Credits
Semester I	8	640	20
Semester II	8	640	20
Semester III	8	640	21
Semester IV	7	640	20
Semester V	8	640	21
Semester VI	4	640	18
		Total	**120**

Semester III

S.No	Course Category	Course Type	Subject Code	Course Title	L-T-P	Periods	Credit	End Exam
1	Program Core	Theory	CEH301	Mechanics of Materials	3-0-0	45	3	Theory
2	Program Core	Theory	CEH302	Construction Materials	3-0-0	45	3	Theory
3	Program Core	Practicum	CEH373	Surveying Practice	1-0-4	75	3	Practical
4	Program Core	Practicum	CEH374	Building Planning and Drawing	1-0-4	75	3	Practical
5	Program Core	Practicum	CEH375	Hydraulics	1-0-4	75	3	Practical
6	Program Core	Practicum	CEH376	Material Testing Lab	1-0-4	75	3	Practical
7	Open Elective	Advanced Skill Certification		Advanced Skills Certification - 3	2-0-2	60	2	NA
8	Humanities & Social Science	Integrated Learning Experience		Growth Lab	-	30	0	NA
9	Audit Course	Integrated Learning Experience		Induction Program – II	-	16	0	-
10	Audit Course	Integrated Learning Experience		I&E/ Club Activity/ Community Initiatives	-	16	0	-
11	Audit Course	Integrated Learning Experience		Shop floor Immersion	-	6	0	
12	Audit Course	Integrated Learning Experience		Student-Led Initiative	-	24	0	-
13	Audit Course	Integrated Learning Experience		Emerging Technology Seminars	-	8	0	-
14	Audit Course	Integrated Learning Experience		Health & Wellness	0-0-2	30	1	-
15	Library					15		
16	Test/Revision					45		
						640	**21**	

Note: *Test & Revisions - 45 Periods | Library Hours - 15 Periods*

Semester IV

#	Course Category	Course Type	Subject Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	CEH401	Mechanics of Structures	4-0-0	60	4	Theory
2	Program Core	Theory	CEH402	Transportation Engineering	3-0-0	45	3	Theory
3	Program Core	Practicum	CEH473	Soil Mechanics and Foundation Engineering	1-0-2	45	2	Practical
4	Program Core	Practicum	CEH474	Concrete Technology	1-0-4	75	3	Practical
5	Engineering	Practicum	CEH475	Construction Practices	1-0-4	75	3	Practical
6	Program Core	Practicum	CEH476	Estimation and Costing	1-0-4	75	3	Practical
7	Open Elective	Advanced Skill Certification		Advanced Skill Certification - 4	2-0-2	60	2	NA
8	Audit Course	Integrated Learning Experience		I&E /Club Activity/Community Initiatives	-	30	0	-
9	Audit Course	Integrated Learning Experience		Shop Floor Immersion	-	15	0	
10	Audit Course	Integrated Learning Experience		Student Led Initiative	-	24	0	-
11	Audit Course	Integrated Learning Experience		Emerging technology seminars	-	16	0	-
12	Audit Course	Integrated Learning Experience		Health & Wellness	-	30	0	-
13	Audit Course	Integrated Learning Experience		Special Interest groups *(Placement training)*	-	30	0	-
14	Library					15		
15	Test					45		
						640	**20**	

Note: *Test & Revisions - 45 Periods | Library Hours - 15 Periods*

Semester V

#	Course Category	Course Type	Subject Code	Course Title	L-T-P	Period	Credit	End
1	Program Core	Theory	CEH501	Design of RCC Structures (Limit State Method)	4-0-0	60	4	Theory
2	Program Elective	Theory	CEH582- CEH586	Elective-1	3-0-0	45	3	Theory
3	Program Core	Lab	CEH577	Computer Applications in Civil Engineering.	0-0-4	60	2	Practical
4	Program Core	Practicum	CEH578	Construction Management and Safety Practice	1-0-4	75	3	Practical
5	Program Core	Practicum	CEH579	Environmental Engineering	1-0-4	75	3	Practical
6	Program Core	Practicum	CEH57A	Innovation and Startup	1-0-2	65	2	Project
7	Project/Internship	Internship		Industrial Training* [Summer Vacation - 90 Hours]	-	-	2	Project
8	Open Elective	Advanced Skill Certification		Advanced Skills Certification - 5	2-0-2	60	2	NA
9	Audit Course	Integrated Learning Experience		Induction program III	-	40	0	-
10	Audit Course	Integrated Learning Experience		Student-Led Initiative	-	30	0	-
11	Audit Course	Integrated Learning Experience		Health & Wellness	-	30	0	-
12	Audit Course	Integrated Learning Experience		Special Interest Groups (Placement Training)	-	40	0	-
13	Library					15		
14	Test					45		
						640	**21**	

Note: *Test & Revisions - 45 Periods | Library Hours - 15 Periods*

** Internship shall be offered in the summer break between 4th and 5th semester followed by a review and award of credits in the 5th semester*

Elective 1

S. No	Course Category	Course Type	Subject Code	Course Title
1	Program Elective	Theory	CEH582	Mechanical, Electrical, and Plumbing Services
2	Program Elective	Theory	CEH583	Irrigation and water resource engineering
3	Program Elective	Theory	CEH584	Defects in Building and Remedies
4	Program Elective	Theory	CEH585	Urban Planning and Development
5	Program Elective	Theory	CEH586	Building Bye Laws and Statutory drawings

Semester VI

#	Course Category	Course Type	Subject Code	Course Title	L-T-P	Period	Credit	End Semester
1	Open Elective	Theory	CEH681- CEH688	Electives-2 (Pathway)	3-0-0	45	3	Theory
2	Open Elective	Practicum	CEH679- CEH67B	Elective-3 (Specialisation)	1-0-4	75	3	Practical
3	Project/Internship	Project/Internship	CEH67C- CEH67E	In-house	-	520	12	Project
						640	**18**	

Note:

1. Suggested Tests and Reviews - 40 Periods

2. For all semesters, the type of End Semester examination for practicum subjects is based on the higher credits towards the theory or practical component of the respective course.

3. Some of the audit courses are non-credited but compulsory courses that are a part of the program initiative and the implementation process has to be recorded.

4. 1 Credit for Projects is equivalent to 45 periods for projects/internships/fellowship

5. Electives 3&4 are considered as Open Elective provisioning the option for students to take courses from other departments also if suitable with approval from the Head of the Institution

Elective 2 (Pathway)

S.No	Course Category	Course Type	Subject Code	Course Title
1	Elective | Higher Education	Theory	CEH681	Advanced Engineering Mathematics
2	Elective | Entrepreneurship	Theory	CEH682	Entrepreneurship
3	Elective | Technocrats	Theory	CEH683	Project Management
4	Elective | Technocrats	Theory	CEH684	Remote Sensing and Geoinformatics
5	Elective | Technologists	Theory	CEH685	Advanced Environmental Engineering
6	Elective | Technologists	Theory	CEH686	Advanced Concrete Technology
7	Elective | Technologists	Theory	CEH687	Advanced Transportation Engineering
8	Elective | Technologists	Theory	CEH688	Advanced Surveying

Elective 3 (Specialization)

S.No	Course Category	Course Type	Subject Code	Course Title
1	Elective	Practicum	CEH679	Artificial Intelligence and Machine Language in Construction Management
2	Elective	Practicum	CEH67A	Structural Detailing for RCC elements
3	Elective	Practicum	CEH67B	Design and Drawing of Steel Elements

Project/Internship

S.No	Course Category	Course Type	Subject Code	Course Title
1	Project/Internship	Project/Internship	CEH67C	In-house Project
2	Project/Internship	Project/Internship	CEH67D	Internship
3	Project/Internship	Project/Internship	CEH67E	Fellowship

III SEMESTER

CEH301	Mechanics of Materials	L	T	P	C
Theory		3	0	0	3

Introduction:

This is a fundamental subject which covers broad elements of engineering mechanics and strength of materials. Strength of materials, also known as mechanics of materials, is a branch of engineering that deals with the behavior of solid objects when acted upon by objects. Because it deals with how objects deform under loading, strength of materials is an essential topic for civil engineers. Study of this subject enables the student to distinguish between different types of stress and strain in a material, under the action of external forces. The student will learn to analyze simple structural elements for their design which he usually needs in the professional life. Teachers while imparting instruction should stress on concepts and principles and provide considerable practice in problem solving.

OBJECTIVES

- To understand the Stress, strain and elastic constants.
- To understand the nature of stresses induced in material under different loads.
- To plot the variation of shear force and bending moments over the beams under different types of loads.
- To study about geometrical properties of section and able to locate centroid and find out moment of Inertia.
- To understand the stresses in beams.
- To Analyze Pin jointed frames.
- Solving problems in the course of study.

Course Outcomes:

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

CO1 Understand and explain the fundamental concepts of forces, stresses, strains, and mechanical properties of materials, including elastic constants and their relationships.

CO2 Analyze shear force and bending moment in various types of beams under different loading and support conditions and draw corresponding diagrams.

CO3 Determine geometrical properties of sections such as centroid, moment of inertia, radius of gyration, and section modulus for common cross sections.

CO4 Apply the theory of simple bending to calculate bending stresses and understand the behavior of beams under bending loads.

CO5 Analyze pin-jointed frames (trusses) using the method of joints for determinate structures and identify zero-force members.

Pre-Requisites: Nil

CO-POs & PSOs Mapping

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	2	2	-	-	1	-	-
CO3	-	3	2	2	-	2	-	-	-
CO4	-	-	3	-	1	-	-	3	2
CO5	-	-	-	3	-	-	1	-	-

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

Instructional Strategy:

This subject is introduced so that diploma holder in Civil Engineering may appreciate the concepts and principles of mechanics of materials of various elements of building and are able to apply the knowledge gained through the subject for the design of simple and small components. Teacher should give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve the tutorial problems independently. Teacher may conduct weekly small quiz sessions to know the students' level of understanding and if need be, teacher may reinforce the concepts and principles related to mechanics of materials of elements/members of building components.

CEH301	Mechanics of Materials	L	T	P	C
Theory		3	0	0	3

Unit I	**SIMPLE STRESSES AND STRAINS**	
	1. INTRODUCTION TO STRESSES AND STRAINS Definitions of Force, Moment of force - Types of forces on structural members-Mechanical properties of materials –Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability- Definitions of stress and strain-Types of stresses, Tensile, Compressive and Shear stresses- Types of strains-Tensile, Compressive and Shear strains-Elongation and Contraction-Longitudinal and Lateral strains–Poisson's Ratio-Volumetric Strain-Simple problems in computation of stress, strain, Poisson's ratio. Hooke's law-Elastic Constants Definitions of: Young's Modulus of Elasticity–Shear modulus(or)Modulus of Rigidity-Bulk Modulus –Relationship between elastic constants (Derivations not necessary)-Simple problems.	9
Unit II	**SHEAR FORCE AND BENDING MOMENT IN BEAMS**	
	2.1 TYPES OF BEAMS AND LOADS Definition of a beam–Support conditions and diagrammatic representation – Types of supports-Types of beams based on support conditions– Diagrammatic representation of beams–Static equilibrium equations– Determinate and indeterminate beams- Load-Axial Loads-Transverse Loads-Types of loads (Concentrated, uniformly distributed and varying loads)-Diagrammatic representation of beams with different loads. **2.2 SHEAR FORCE AND BENDING MOMENT** Definition of Shear force and Bending Moment–Conventional signs used for S.F. and B.M - SFD &BMD – S.F and B.M of Cantilever beam with endpoint load/UDL for entire span & simply supported beams with central point load/ UDL for entire span and draw SFD&BMD. Numerical problems on SF& BM for cantilever beams (Maximum Three concentrated loads/UDL for entire span / Combination of Maximum Three-point loads with UDL for entire span / UDL	9

	for the half-length from fixed end only /. For simply supported beams (Central point load/Single eccentric point load / Two equal point loads at one-third points /UDL for entire span/ Combination of central point load and UDL throughout the beam only).	
Unit III	**GEOMETRICAL PROPERTIES OF SECTIONS**	
	3.1 CENTROID Geometrical properties–Definitions and examples of Symmetrical, Anti Symmetrical, Asymmetrical shapes - Definitions of center of gravity and centroid – Centroid of Symmetrical shapes (square, rectangular, circular,) Numerical problems determination of centroids of T Section and I Sections only. **3.2 MOMENT OF INERTIA** Definitions of: Inertia, Moment of Inertia, Polar moment of inertia, Radius of gyration, Section Modulus, Polar modulus-Parallel and perpendicular axes theorems (statement only) - Numerical problems on M.I about centroidal axis, Section modulus, Radius of gyration of (solid/hollow) square, (solid/hollow) rectangular and(solid/hollow) circular sections (Derivation not required)–Numerical problems on M.I about centroidal axis of T Section and I Sections only.	9
Unit I**V**	**STRESSES IN BEAMS**	
	STRESSES IN BEAMS DUE TO BENDING Types of Bending stresses–Neutral axis–Theory of simple bending–Assumptions–Moment of resistance – Flexure/bending equation M / I = E / R = σ/y (Derivation not required)– Bending stress distribution –Curvature of beam–Position of N.A and centroidal axis–Stiffness equation–Flexural rigidity–Strength equation–Significance of Section modulus–Numerical Problem on simply supported beam with symmetrical loads only.	9
Unit **V**	**PIN JOINTED FRAMES**	
	ANALYSIS BY ANALYTICAL METHOD (METHOD OF JOINTS) Definitions of: Frame / Truss, Pin Joint, Nodes, Rafters, Ties, Struts, Slings-Determinate and indeterminate frames–Classification of frames-Perfect and	9

	imperfect frames–Deficient/Instable and redundant frames-Resolutions of force-Designation of forces-Nature of force in the frame-Identification of member with zero force in a determinate truss- Methods of analysis-Analytical methods-Method of Joints and Method of Sections (Description only) - Problems on Analysis of cantilever (with not more than eight members) with vertical nodal loads by method of joints only) and simply supported perfect frames(with not more than ten members) with vertical nodal loads (Symmetrical frame only) by method of joints only.	

Suggested student activities

1. Quiz.
2. Group discussion.
3. Seminar.
4. Surprise tests.
5. Laboratory tests on materials.
6. Class assignments.

TEXT BOOKS

Sl.No	Title	Author	Publisher
1	Strength of materials	B.C.Punmia	Lakshmi publications, Delhi
2	Strength of Materials	S. Ramamrutham	Dhanpatrai&Sons,Delhi
3	Engineering Mechanics & Strength of Materials	R.K. Bansal	Lakshmi publications, Delhi
4	Fundamentals of Strength of Materials	P.N.Chandramouli	PHI Publisher
5	Strength of Materials	R.Subramanian	Oxford publisher
6	Strength of Materials	S.S Bhavikatti	Vikas Publishing House

7	Elements of strength of materials	Timoshenko and Young	CBS Publications
8	Solution of problems in strength of materials	S.A.Urry	Sir. Isaac Pitman & sons Ltd.
9	Engineering Mechanics Tamil version	Dr.A.Elangovan	Anna University
10	A Textbook Of Strength Of Materials	R. K. Rajput	Laxmi Publications Pvt Ltd
11	Strength Of Materials (mechanics Of Solids)	R.S. Khurmi,N. Khurmi	S. Chand Publishing
12	Strength Of Materials (Diploma)	T. S. Venkatesh	Nandu Printers & Publishers Pvt. Ltd

Web resources

https://nptel.ac.in/

https://ndl.iitkgp.ac.in

Stress and strain
https://www.youtube.com/watch?v=KGCyT2oVa_A&list=PLd4YqEvwJs8YZ79RCYe3Cg6bljJv-nGB-

An introduction to stress and starin

https://www.youtube.com/watch?v=aQf6Q8t1FQE

Stress strain curve

https://www.youtube.com/watch?v=7OXQNv73qr4

SFD and BMD

https://www.youtube.com/watch?v=UahfUvcS24o&list=PL4K9r9dYCOopLQIqfKO5haEkR1FKKVJdU

Understanding Shear Force and Bending Moment Diagrams

https://www.youtube.com/watch?v=C-FEVzI8oe8

SFD and BMD of simply supported beam

https://www.youtube.com/watch?v=J7nyhgiJFmQ

SFD and BMD of cantilever beam

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

How to find Centroid of an I– Section

https://www.youtube.com/watch?v=v6VTMwxx4oA

M.I of T section

https://www.youtube.com/watch?v=dbiPJ5qJ_EI

Understanding stresses in beams

https://www.youtube.com/watch?v=f08Y39UiC-o

Understanding stresses in shaft

https://www.youtube.com/watch?v=1YTKedLQOa0

Understanding and Analysing Trusses

https://www.youtube.com/watch?v=Hn_iozUo9m4

Method of joints

https://www.youtube.com/watch?v=_rK02neOF18

CEH302	Construction Materials	L	T	P	C
Theory		3	0	0	3

Introduction:

In Civil Engineering construction field, building materials can generally be divided into two categories viz., natural and man-made construction materials. This Course is designed to understand various properties, Manufacturing process, characteristics and material suitability for different construction activities. Civil Engineers must know the quality; material standards and properties of materials used in any construction. Hence this course is designed as to provide in depth conceptual understanding about the various construction materials.

Course Objectives:

The objective of this course is to enable the student to

- Understand about Physical, Mechanical, Chemical and Thermal properties of construction materials.
- Understand about new and advanced construction materials available around the globe.
- Compare the suitability of materials for different construction purpose.
- Understand about the raw materials and manufacturing process of various construction materials

Course Outcomes:

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

CO1 Identify and describe natural construction materials and their properties relevant to civil engineering applications.

CO2 Select and explain artificial construction materials, including bricks, masonry blocks, ceramic products, and glass, for various construction uses.

CO3 Understand and apply knowledge of cementitious, bituminous, and lime-based materials used in construction.

CO4 Identify timber, mortar, concrete, protective materials, and coatings, and their suitability in construction projects.

CO5 Recognize metallic, plastic, and composite materials, including roofing and façade materials, and their applications in construction.

Pre-requisites:
Knowledge of basic Science and basic knowledge on materials.

CO/PO & PSOs Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-
CO3	-	-	2	2	2	-	-	-	2
CO4	-	-	3	-	-	2	-	-	2
CO5	-	-	2	-	-	-	1	3	1

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

Instructional Strategy:

- Since this course covers vast area, Teachers are expected to impart technical knowledge to the students about construction materials by screening the pictures /videos of various materials used in construction.
- Students shall be asked to visit various stores/dealers selling standard construction materials. (For better understanding about available market forms and cost of materials).
- Emphasis shall be given to understand durability and sustainability of materials used in construction
- Apart from syllabus content, Students shall be encouraged to learn about modern construction materials through online sources.

CEH302	Construction Materials	L	T	P	C
Theory		3	0	0	3

Unit I	Construction Materials and Properties	
1.1 **Introduction** History of building materials-Conventional building materials-New and advanced materials -Eco friendly and green construction materials (Definition and any five materials)- Energy efficient and sustainable building materials (Definition and any five materials). **1.2 Properties of construction Materials** Density-Specific gravity - Porosity-Water absorption – Permeability - Chemical resistance-weathering resistance-Fire Resistance-Thermal Conductivity-Thermal expansion-sustainability to freezing and thawing - Durability-Factors affecting durability of building materials. **1.3. Aggregates** Classification of aggregates -Natural aggregates -Artificial aggregates – Light-weight aggregates-Heavy weight aggregates-Recycling of aggregates. **1.4. Water** Requirements of water used in construction works-Effects of presence Sulphates and chlorides in water-Permissible limits of deleterious materials as per Indian standard, IS456:2000.		9

Unit II	Bricks, Masonry blocks, Ceramic products, and Glass	
2.1 Clay bricks Brick-Brick Earth-Composition of good brick earth-Classification and grades of bricks as per BIS-Compressive Strength-Characteristics of good brick-Special types of brick and uses. **2.2. Masonry blocks** Masonry blocks-Constituents, Properties, Characteristics and uses of- Fly ash bricks-Solid blocks- Hollow blocks, -AAC blocks. **2.3 Ceramic Products**		9

Ceramic products- Properties, Characteristics and uses of Earthenware-Stoneware-Porcelain-Terracotta-Ceramic Tiles-Glazed Tiles-Thermal care tiles-Roof tiles. **2.4 Glass** Definition-Constituents of glass-Classification of glass-Size and thickness.		
Unit III	**Cementitious materials**	
3.1 Cement Cement - Composition of Ordinary Portland cement-Portland Pozzolanic cement - Grades of cement-Water cement ratio-Hydration of cement- Setting of cement-Formation of Bogus compounds. 3.2 **supplementary cementitious materials** Pozzolanic materials-Fly Ash-Types-Ground Granulated blast furnace slag- Silica fume- Natural Pozzolans. **3.3 Lime** Sources of lime-Classification of lime-Uses of lime-Slaking of lime-Lime Mortar -Lime Putty-Uses. **3.4. Bituminous materials** Introduction-Bitumen-Tar-Asphalt-applications.		9
Unit IV	**Timber, mortar, Concrete, Protective materials and Coatings**	
4.1. Timber and wooden products Classification of Timber-Seasoning of Timber-Methods of seasoning- Defects in Timber-Preservation of Timber-Wood Products. **4.2 Mortar** Introduction-Classification-Characteristics of good mortar- mix ratios for different works-Grouting-Guniting. **4.3 Concrete** Concrete-Production- Mix Ratios-Mixing-Workability-Ready mix concrete— Strength of concrete-non-destructive test on Concrete-Durability-factors affecting durability of concrete. **4.4 Protective & Insulating materials** Damp proof–Water Proof-Termite proof –Pest control in buildings-Heat insulating materials-Sound insulating materials. **4.5. Paints and Varnishes**		9

Introduction-Characteristics of ideal paint-Types of paints-Distemper- Varnishes.		
Unit V	**Metallic, Plastic and Composite materials**	
5.1. Metals and composites Metals used in construction-Steel-Galvanised Iron-Stainless steel -Pipes-Structural Steel-Market forms of steel sections-cold formed Light gauge sections- Aluminium and Composites. **5.2 Plastics in construction** Plastics –Characteristics – plastic products-PVC pipes-UPVC Pipes, Doors and windows, Water tanks-CPVC-PVC materials used in water supply, sanitary and electricity plumbing- Standards as per BIS. **5.3. Roofing materials** Types of roofing materials- RCC-AC Sheets-G. I Sheets-Galvalume Sheets-Insulated roofing sheets-False Ceiling-Materials used for false ceiling. **5.4. Elevation and façade materials** Importance of facade design in architecture-Types of materials used--Insulated glass, Aluminum composite panels, Fibre cement, Wood Plastic composites, cladding- types		9
TOTAL PERIODS		**45**

Suggested List of Students Activity:

- For better understanding about various construction materials, Student shall actively visit Standard stores, and different ongoing construction sites.
- Web based learning is encouraged.

Text and Reference Books:

1. S.C.Rangwala, "Engineering Materials" Charotar Publishing House Pvt.Ltd,43rd Edition, 2019.
2. P.C.Varghese," Building Materials" Prentice Hall of India Pvt Ltd, 2nd Edition,2015.
3. S.K.Duggal, "Building Materials" New Age International (P) Ltd, 3rd Edition ,2012
4. Indian Standard, IS 383:2016, Coarse and Fine aggregates for concrete-specification.
5. Indian Standard, IS 456:2000, Plain and Reinforced cement concrete.

Web-based/Online Resources:

1. **Evoluation of construction and building materials: https://www.buildersmart.in/blogs/evolution-of-construction-and-building-materials**

2. **Green building materials: https://www.coa.gov.in/show_img.php?fid=137**

3. **Energy efficient building materials: https://archiroots.com/10-best-energy-efficient-building-materials/**

4. **National building code of india 2016(NBC 2016) : https://www.bis.gov.in/standards/technical-department/national-building-code/**

CEH373	Surveying Practice	L	T	P	C
Practicum		1	0	4	3

Introduction:

At the diploma level of Civil Engineering studies, students are expected to develop skills in managing sites, taking measurements, surveying and inspection. One of the main focuses of survey work is the development of townships, residential colonies, public buildings, and other structures. Hence, it is necessary to have a thorough knowledge of surveying principles and techniques such as chain surveying, compass surveying, levelling, Theodolite surveying, Tachometric surveying, and modern surveying. Teachers are expected to explain various concepts and principles by demonstrating the use of different equipment and conducting practical exercises in all types of surveying to benefit the students.

Course Objectives:

The objective of this course is to enable the student

- Gain a foundational understanding of surveying by familiarizing with key concepts and surveying instruments.
- Explore the principles of chain, compass, levelling, and contour surveying, and learn about the various types of levels and levelling methods.
- Expand knowledge to include Theodolite, Tachometry surveying, Trigonometrical levelling, and GPS.
- Finally, discover the principles and applications of Total Station in civil engineering.

Course Outcomes:

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

CO1 Understand fundamental surveying concepts, units, and chain and compass surveying techniques for field measurements.

CO2 Perform levelling and contouring surveys to determine elevations and prepare contour maps.

CO3 Conduct tacheometric surveying and compute areas and volumes using various numerical methods.

CO4 Apply the knowledge of principles and purpose of tacheometric surveying and areas and volumes.

CO5 Use modern surveying instruments like Total Station and GPS for precise measurement, data collection, and mapping in civil engineering projects.

Pre-Requisites: Nil

CO-POs & PSOs Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	-	2	-	-	1	-	-
CO3	-	3	-	2	-	2	-	-	-
CO4	-	-	3	-	1	-	-	3	2
CO5	-	-	-	3	-	-	1	-	-

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

Instructional Strategy:

- Teachers have the responsibility to provide theoretical knowledge on surveying equipment and its standard procedures. This will help students to understand the importance of each surveying equipment. Additionally, teachers should encourage students to practice using all surveying equipment.
- To ensure that learning is outcome and employability-based, a theory-demonstrate-practice-activity strategy can be implemented throughout the course. This approach will help students to better assimilate the knowledge they have acquired.
- Furthermore, teachers should encourage active participation from students in both theoretical and practical classes. This will help to increase their confidence in their learning abilities.

CEH373	Surveying Practice	L	T	P	C
Practicum		1	0	4	3

Unit I	CHAIN & COMPASS SURVEYING	
	1.1 Introduction Definition of surveying - object of surveying - Division of surveying - Surveying Units and its conversion. **1.2 Chain surveying**: Ranging – Types - Direct and Indirect ranging - Survey stations- types - Baseline - Check line - Tie line - Chain triangulation - Offsets - Types. **1.3 Compass Surveying** Compass- Types – Purpose – Whole Circle Bearing and Reduced Bearing- Fore and Back bearing - Magnetic dip and Declination – Meridian - Types - Bearing – Types - Open and closed traverse. **Exercises:** 1) Study of FMB sketch/Land documents and instruments used for chain surveying**.** (Not for examination) 2) Determine the distance between two ground stations with the help of a chain. (Direct ranging) 3) Calculate the area bounded by the given points by chain triangulation. 4) Find the included angle of the given closed traverse by using a compass (Minimum 5 stations).	3 3 3 3 3 3
Unit II	LEVELLING & CONTOURING	

	2.1 Levelling Levelling - Temporary adjustment – Terms used in Levelling - Back Sight - Fore sight - Intermediate sight - Changepoint -Benchmark – Types - field book – Methods of Reduction of levels - Height of collimation - Rise and Fall method. **2.2 Contour Surveying:** Definition - Contour - Contouring - Contour interval – horizontal	3
	equivalent-Characteristics of Contours - Contour Gradient – interpolation of contours - Uses of Contour plan and Map **Exercises:** 5) Determine the elevations of given points (Minimum 6 points) by conducting fly levelling with Height of collimation method. 6) Determine the elevations of given points (Minimum 6 points) by conducting fly levelling with Rise and fall method. 7) Conduct a block contouring survey in the given irregular field and plot the contour lines. (Not for examination)	3 3 6
Unit III	THEODOLITE SURVEYING & TRIGONOMETRICAL LEVELLING	
	3.1 Theodolite surveying Theodolite – Types - Transit and non-Transit - Vernier and Micrometer - Technical terms used - Temporary adjustments - Fundamental lines - Interrelationships – Horizontal angle determination by repetition method and reiteration method - Latitude and Departure - Consecutive coordinates - Independent coordinates. **3.2 Trigonometrical Levelling** Definition - Uses - Finding elevation of objects - Base accessible - Base inaccessible - Single plane method (No derivation) - Double plane method. (No derivation) **Exercises:** 8) Determination of distance between two points when their bases are	3 3

	accessible, using Theodolite – Measuring Horizontal angles by repetition method and distances from a Theodolite station.	3
	9) Determination of distance between two points when their bases are inaccessible, using Theodolite – Measuring Horizontal angles by reiteration method from a baseline.	3
	10) Determine the elevation of an object when the base is accessible by trigonometrical levelling.	3
	11) Determine the elevation of an object when the base is inaccessible by single plane method.	

Unit IV	TACHEOMETRIC SURVEYING & AREAS AND VOLUMES	
	4.1 Tacheometry Instrument used – System of Tacheometry - stadia and tangential - Fixed hair method and movable hair method - Tacheometric Constants - Anallactic lens (No Proof) – Uses - Distance and elevation formulae for horizontal and inclined line of sight (No derivation) - Uses of tacheometry. **4.2 Areas and volumes** Methods of determining areas and volumes - Mid ordinate rule - Average ordinate rule - Trapezoidal rule - Simpson's rule - One-level section and two-level section. **Exercises:** 12) Determine the constants of the given tacheometer. 13) Determine the gradient between two points by stadia tacheometry. 14) Calculate the area of the given irregular field by using the Trapezoidal rule 15) Calculate the area of a given irregular field by using Simpson's rule.	3 3 3 3 3
Unit V	MODERN SURVEYING	
	5.1 Total station Introduction – components parts – accessories used –Summary of total station characteristics –Features of total station- applications of total station - Instrument preparation and setting. **5.2 Global Positioning System** Introduction - Maps - Types of maps - Various satellites used in GPS – Fundamentals of GPS - Handheld GPS - Differential GPS - Applications of GPS in Civil Engineering field. **Exercises:** 16) Determine the Horizontal distance, slope distance, height, and horizontal and vertical angle of given points using Total Station. (Minimum 5 points) 17) Find the coordinates of closed traverse stations using the Total Station and determine the area of the traverse.	3 3 3

	18) Determine the area of a field/ Land/College campus etc. using Total Station. **(Not for examination).**	6
	TOTAL	**75**

List of Suggested Student Activities:

- Collect the information on survey instruments available in the market with specifications.
- Watch educational videos on various surveying methods to understand the concepts.
- Visit any construction site and make a report on different types of conventional and modern surveying equipment used.
- Perform reconnaissance survey for alignment of road.
- Additional surveying practices can be undertaken on the campus itself.

Reference

1) Duggal, S.K, Surveying Vol.I & II, Tata Mcgraw Hill, New Delhi
2) Subramanian, R., Surveying & Levelling, Oxford University Press, New Delhi
3) Punamia, B.C., Surveying Vol. I, II & III, Laxmi Publications
4) Kanetkar, T.P. and Kulkarni, S.V., Surveying and Levelling Vol. I & II, Pune Vidyarthi Gruh
5) Arora, K.R., Surveying Vol. I, II & III, Standard Book House. New Delhi
6) Basak, N.N., Surveying and Levelling, Tata Mcgraw Hill, New Delhi
7) A. Bannister, S. Raymond, R. Baker, "Surveying", Pearson, 7th ed., NewDelhi
8) Agor, R., Surveying and Levelling, Khanna Publishers, New Delhi
9) Roy, S.K., Fundamentals of Surveying, Prentice Hall India, New Delhi
10) Bhavikatti, S. S. -I. K. International, New Delhi.
11) Textbook of Surveying-Venkatramaiah, C -Universities Press.New Delhi

Web-based/Online Resources

CHAIN & COMPASS SURVEYING

Direct Ranging	:	https://www.youtube.com/watch?v=x8FaSZCPbM8
Indirect Ranging	:	https://www.youtube.com/watch?v=6oIyMP2iO5s
Chain Triangulation	:	https://www.youtube.com/watch?v=wbd-Ib2xc0Y
Measuring Horizontal Distance by the Direct Method: Chaining on Sloping Grounds	:	https://www.youtube.com/watch?v=dwNHZbZ40AQ
Types of Cross Staff	:	https://www.youtube.com/watch?v=w0OBpHLQv7w
Difference b/w surveyor & prismatic compass	:	https://www.youtube.com/watch?v=5DsCSxKkGws
Whole circle bearing & Quadrantal bearing	:	https://www.youtube.com/watch?v=iLQYLoc4ja4
Conducting a closed traverse (Irregular polygon) in surveying	:	https://www.youtube.com/watch?v=pGS2YX30nI8
Open traverse	:	https://www.youtube.com/watch?v=6NA3Y79Pf38
Local attraction and its correction	:	https://www.youtube.com/watch?v=2EYQDwcizcE

LEVELLING & CONTOURING

Temporary adjustment in levelling	:	https://www.youtube.com/watch?v=NDK1t9RdMy0
Levelling survey	:	https://www.youtube.com/watch?v=_SiSn_tcXZA
Contour surveying	:	https://www.youtube.com/watch?v=iZrNkKBPocc

THEODOLITE SURVEYING & TRIGNOMETRICAL LEVELLING

measurement of horizontal angle repetition method	:	https://www.youtube.com/watch?v=lTJE-PJR0ds
measurement of horizontal angle reitration method	:	https://www.youtube.com/watch?v=p2j9W1IuDT0
Latitude and departure	:	https://www.youtube.com/watch?v=a38vHYfbgTs
Trigonometrical levelling	:	https://www.youtube.com/watch?v=_y24shD5UlE

TACHEOMETRY & GPS

Tachometry surveying	:	https://www.youtube.com/watch?v=RqN00_Zajsg
How does GPS work	:	https://www.youtube.com/watch?v=U3eX6QKS9kY

GPS 72H (GARMIN 72H) for checking latitude, longitude, AMSL, Bearing angle, distance. : https://www.youtube.com/watch?v=jRqYLUDBPdE

TOTAL STATION

Total station full tutorial : https://www.youtube.com/watch?v=xaQz-VBaHKU

Total station survey : https://www.youtube.com/watch?v=nD9jVSCfoLg

Set out coordinates in field using Total Station : https://www.youtube.com/watch?v=os1FUOidwzo

Components of the Total Station : https://www.youtube.com/watch?v=faLOzJdCX7Q

LIST OF EQUIPMENTS (for a batch of 30 students):

S. No.	List of Equipment required	Quantity Required
1.	Chain with arrows	6 Nos.
2.	Ranging Rod	30 Nos.
3	Cross Staff	6 Nos.
4.	Tape	6 Nos.
5.	Prismatic Compass with Stand	6 Nos.
6.	Dumpy Level with tripod	6 Nos.
7.	Levelling staff	10 Nos.
8.	Theodolite with tripod	6 Nos.
9.	Total Station with all accessories	3 Nos.

CEH384	Building Planning and Drawing	L	T	P	C
Practicum		1	0	4	3

Introduction

Drawing is the language of engineers. Engineering is incomplete without a thorough knowledge of drawing. A Civil Engineering diploma holder must be capable of sketching detailed constructional drawing of various components of building for the purpose of communication with the craftsman. Planning of small buildings, developing a line plan, dimensioning, key plan, drainage plan should be a part of curriculum. The diploma engineer must be conversant with reading and interpretation of drawings for execution of work.

Course Objectives:

1. Impart basic knowledge of the principles of building planning and drawing
2. Impart the knowledge of 2D building drawings required for various civil engineering applications.
3. Enable the students to prepare submission drawings and service plans

Course Outcomes:

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

CO1 Understand and apply basic principles of building drawing including conventions, symbols, and CAD drafting techniques for construction materials, fixtures, and structural elements.

CO2 Plan and prepare detailed drawings (plan, section, elevation) of residential buildings considering functional requirements, room sizes, furniture layout, and structural elements.

CO3 Develop plans, sections, and elevations for public buildings incorporating general and specific requirements, including landscape architecture.

CO4 Design and draw industrial building plans, sections, elevations, and structural components such as roof trusses and pre-engineered structures.

CO5 Use CAD software effectively to create accurate building drawings and prepare approval drawings for various building types.

Pre-requisites:

1. Basic Drawing Skills
2. Understanding of Geometry
3. Spatial Visualization Ability
4. Computer Literacy
5. Enough knowledge in Drafting Practice Subject which is available in II Semester

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	2	2	-	-	1	-	-
CO3	-	-	2	-	-	2	-	-	-
CO4	-	-	3	-	1	-	-	3	2

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

Instructional Strategy:

1. Start by introducing the importance of building drawing in architecture, engineering, and design.
2. Explain basic terminology such as elevation, plan, section, perspective, etc.
3. Provide examples of famous architectural drawings and discuss their significance.
4. Encourage students to continue practicing and refining their drawing skills even after the course ends.
5. Provide resources for further self-study and exploration in building drawing and related fields.

CEH374	Building Planning and Drawing	L	T	P	C
Practicum		1	0	4	3

Note: All the drawings should be created using CAD Software and the printout should be submitted for evaluation

Unit I	Introduction to building Drawing	
Theory		3
Basic principle of building drawing-General – Conventions- Title block- Scales- Line work- Lettering -Symbols – Abbreviations-Conventional signs for materials like bricks, stone, concrete, wood, glass, earth, steel - water supply and sanitary fixtures like tap, wash basin, sink, W.C pan (Indian and European type), shower, flush tank.-Electrical installations like one way switch, Two way switch, Distribution Board, Socket, Ceiling fan, LCD bulb, Fluorescent Lamp, Bell-Doors-Windows-Furniture's-Structural Elements like steel bars, stirrups		
Practical		
1. Sketch the Conventional signs for different construction materials		3
2. Sketch the Conventional signs for different water supply and sanitary fixtures		3
3. Draw the Conventional signs for Door, window and furniture items		3
Unit II	**PLANNING OF RESIDENTIAL BUILDING**	
Theory		4
Types of residential buildings- Usual Requirements-Types of Rooms – Minimum Size requirement for each type of rooms - Furniture arrangement in each room- Position of stairs / lifts- Position of Doors/ Windows House drainage and Sanitary fittings – Sump/Water tanks -Plumbing Pipes		
Practical		
4. Preparation of plan, section and elevation of a single storey House with single bed room and attached bathroom with R.C.C. flat roof (load bearing structure)		6
5. Preparation of plan, section and elevation of a single storey Two BHK house with RCC flat roof (Framed structure)		6
6. Preparation of approval drawing for Two BHK Residential building with RCC flat roof. (Not for Examination)		6

Unit III	PLANNING OF PUBLIC BUILDING	
Theory		4
Types of public buildings - Miscellaneous public buildings - Usual requirements- General requirements of Public Buildings -Landscape architecture		
Practical		
7.	Preparation of plan, section and elevation of a single storey Primary health centre for rural area with R.C.C flat roof. (Framed structure)	6
8.	Preparation of plan, section and elevation of a Single storied Primary School building with R.C.C flat roof (Framed structure)	6
9.	Preparation of plan, section and elevation of a Single storied Library building with R.C.C flat roof (Framed structure)	6
Unit IV	**PLANNING OF INDUSTRIAL BUILDING**	
Theory		4
Planning aspects - Requirements of industrial units - Sheets for pitched roof coverings – Rolling Shutters - Ramps- Stores- Public Toilets/ Bath rooms- Dining / Resting halls- Ventilation and Lighting		
Practical		
10.	Draw the elevation of a King post roof truss	5
11.	Preparation of plan, section and elevation of a Small workshop with north light steel roof truss (6 to 10m Span) over R.C.C. Columns.	5
12.	Preparation of plan, section and elevation of a Small Pre-Engineered building.	5
TOTAL HOURS		**75**

Suggested List of Students Activity:

1. Visit architectural sites or use reference images to sketch building facades, architectural details, and urban landscapes, focusing on observation and capturing proportions and details.
2. Present drawings to the class and participate in critique sessions, providing feedback on peers' work and receiving constructive criticism on their own drawings.
3. Analyze and critique architectural drawings from historical and contemporary architects, discussing design principles, drawing techniques, and communication strategies.

4. Assign design projects where students create building drawings for specific scenarios or client requirements, incorporating elements such as site analysis, program development, and conceptual design sketches.
5. Organize group projects where students collaborate to create complex building drawings, simulating real-world teamwork and coordination in architectural practice.

Text and Reference Books:

1. National Building code of India 2016
2. Tamil Nadu District Municipal building rules and by-laws
3. Civil Engineering Drawing and house planning – by B.P.Verma
4. Elements building drawings and design – by R.S.Deshpande and N.K.Karandikar
5. Design of Houses – by J.S.Yadav
6. A Guide to Civil Engg. Drawing – by V.R.Thothathri Dr
7. Building Planning and Drawing by N. Kumaraswamy and A. Kameswara Rao.
8. Civil Engineering Drawing by S.C.Rangwala
9. Building Planning and Construction Companion", G. Vaidhyanathan, I. Kulasekaran, G. Sathish Kumar"

Web-based/Online Resources:

Conventional Symbols: https://youtu.be/HRGKWQjFPho?si=NqzI8qbiK_ugesCy

Introduction: https://youtu.be/nAfjLak2g_s?si=JugW0Q79nMoIfiwn

Auto CAD: https://youtu.be/6QKFgdDg5Yg?si=4uB5Q4CJ2KifytGt Residential

Building: https://youtu.be/9ra0XT_MT-s?si=DnzGZ6FHdI3MFDuP Public

Building: https://youtu.be/-dNCuS2BKz8?si=mm56vQsiLpT9QzFi Industrial

Building: https://youtu.be/c1k1TLMMn-Q?si=LI2CLHScwZzgCmKy

LIST OF EQUIPMENTS (for a batch of 30 students):

S. No.	List of Equipment's required	Quantity Required
1	Computers	30 Nos.
2	Laser printer	2 Nos.
3	CAD software	30 Users

CEH375	Hydraulics	L	T	P	C
Practicum		1	0	4	3

Introduction:

Hydraulics which is also meant by Mechanics of Fluids helps in solving problems in the field of Civil, Environmental, Transportation, Mechanical, Metallurgical Engineering. The subject deals with basic concepts and principles in hydro-statics, hydro - kinematics and hydro-dynamics and their application in solving fluid flow problems. The subject is also designed to study the practical applications of fluid flow problems.

Course Objectives:

The objectives of the course is to enable the students to

- Understand parameters associated with fluid flow and hydrostatic pressure.
- Understand types of forces, energy and application of Bernoulli's theorem.
- Know the different types of Orifices and Mouth pieces and to derive discharge formulae and their practical applications.
- Know the different types of pipes in parallel flow / series flow connected to the reservoirs.
- State the different losses of head of flowing liquids in pipes and their equations.
- Know the different types of Notches, and deriving the discharge formulas and their Practical applications.
- Learn the construction details, specifications and efficiencies of Reciprocating Pumps and Centrifugal Pumps.

Course Outcomes:

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

CO1 Understand and explain fluid properties, types of pressure, and methods of pressure measurement using manometers and gauges.

CO2 Apply Bernoulli's theorem and measure flow parameters using Venturi meter and Orifice meter, determining coefficients of discharge.

CO3 Analyze flow through orifices and mouthpieces, calculate discharge, and determine hydraulic coefficients through experiments.

CO4 Study flow through pipes including head losses, friction factors, and analyze flow in pipe networks.

CO5 Understand the working principles, classification, and performance characteristics of reciprocating and centrifugal pumps, and determine their efficiencies experimentally.

Pre-requisites:

Knowledge of fluids.

CO/PO Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	3	-
CO2	-	3	2	-	-	-	-	3	-
CO3	-	-	2	3	-	-	-	-	-
CO4	-	-	-	-	1	-	1	-	-
CO5	-	-	-	-	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.

CEH375	Hydraulics	L	T	P	C
Practicum		1	0	4	3

Unit I	**INTRODUCTION**	
	1.1 FLUID PROPERTIES & MEASUREMENT OF PRESSURE Hydraulics - Definition - Fluids - Properties of fluids - Types of pressures - Static pressure, Atmospheric pressure, Gauge pressure, Vacuum pressure and Absolute pressure-Measurement of Pressure-Simple Mercury Barometer - Piezometer Tube-Simple U-Tube Manometer-Differential Manometer.	**3**
	1.2 FLOW OF FLUIDS Types of Flow - Energy possessed by a Fluid Body - Potential Energy and Potential Head - Pressure Energy and Pressure Head - Kinetic Energy and Kinetic Head - Total Energy and Total Head - Bernoulli's Theorem (No proof) - Venturi meter - Orificemeter	
	Practical exercises: 1. Study of Manometers and Pressure Gauges. (Not for Exam)	**4**
	2. Verification of Bernoulli's Theorem.	**4**
	3. Flow through Venturimeter - Determination of Co-efficient of Discharge.	**4**
	4. Flow through Orificemeter – Determination of Co-efficient of Discharge.	**4**
Unit II	**FLOW THROUGH ORIFICES AND MOUTH PIECES**	
	Definitions - Types of orifices - Vena contracta - Hydraulic coefficients Cd, Cv and Cc - Formula - Large orifice - Definition - Discharge formula - Practical applications of orifices - Types of mouth pieces-External and internal mouth pieces-Discharge formula.	**3**
	Practical exercises: 5. Flow through orifice - Determination of Co-efficient of Discharge by Time Fall-Head method.	**4**
	6. Flow through orifice - Determination of Co-efficient of Discharge by Constant head method.	**4**
	7. Flow through external cylindrical mouth piece - Determination of Co-	

	efficient of Discharge by Timing fall in head method. 8. Flow through external cylindrical mouth piece - Determination of Co-efficient of Discharge by Constant head method.	**4** **4**
Unit III	**FLOW THROUGH PIPES**	
	Definition of pipe-Losses of head in pipes - Major losses - Minor losses - Sudden enlargement, sudden contraction, obstruction in pipes (No proof) - Energy/Head losses off lowing fluid due to friction – Darcy's equation – Chezy's equation (No derivation) - pipes in parallel flow / series flow connected to a reservoir.	**3**
	Practical exercises: 9. Determination of friction factor for the given GI pipe.	**4**
Unit IV	**FLOW THROUGH NOTCHES AND WEIRS**	
	Definitions-Types of notches - Rectangular, Triangular and Trapezoidal Notches-Formula (No derivation)-Comparison of V-Notch and Rectangular Notch-Weir - definition - classifications of weirs-comparison of Weirs and Notches.	**3**
	Practical exercises: 10. Determination of Co-efficient of Discharge for Rectangular Notch.	**4**
	11. Determination of Co-efficient of Discharge for Triangular Notch.	**4**
	12. Determination of Co-efficient of Discharge for Trapezoidal notch.	**4**
Unit V	**PUMPS**	
	Pumps - Definition - Classification of pumps - Reciprocating pump - Construction Detail and Working Principle - Types - Single Acting and Double Acting - Slip - Air Vessels - Discharge and Efficiency - Centrifugal pump - Advantages and Disadvantages over a Reciprocating pump - Layout - Construction Details - Priming of Centrifugal Pump - Construction and Working of the Pump - Classification - Functions of Foot Valve, Delivery Valve and Non - Return Valve - Fundamental Equation of Centrifugal Pump - Characteristics of a Centrifugal Pump - Discharge, Power and Efficiency.	**3**
	Practical exercises: 13. Prepare a Layout and indicate the construction parts of a Reciprocating pump / Centrifugal pump. (Not for Exam)	**4**
	14. Reciprocating pump - To draw characteristic curves and determine the efficiency.	**4**
	15. Centrifugal Pump - To draw characteristic curves and determine the efficiency.	**4**
	TOTAL	**75**

Suggested list of student activity:

- Explore and investigate the different types of fluids and provide real-time examples of each.
- Presentation by students on major and minor losses of flow through pipes.
- Seminar on the classification of pumps based on their working principle, design, and applications
- 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 Books

1. Dr. JagadishLal - Hydraulics, Fluid Mechanics and Hydraulic Machines - Metropolitan Book Company - New Delhi
2. P.N. Modi &S.M.Sethi-Fluid Mechanics-Standard Publishers - New Delhi
3. S. Ramamirtham-Hydraulics, FluidMechanics and Hydraulics Machines-DhanpatRai & Sons, New Delhi
4. K.L.Kumar - Fluid Mechanics - Eurasa Publshing House - New Delhi
5. R.K.Bansal - Fluid Mechanics-Lakshmi Publications
6. Prof.S.Nagarathinam - Fluid Mechanics-Khanna Publishers - New Delhi
7. K.R. Arora - Hydraulics, Fluid Mechanics and Hydraulics Machines - Standard Publishers & Distributors, New Delhi
8. BCS Rao,"Fluid Me
9. chanics and Machinery"Tata-McGraw-HillPvt.Ltd.,NewDelhi.

LIST OF EQUIPMENTS (for a batch of 30 students):

S. No.	List of Equipment's required	Quantity Required
1.	Bernoulli's theorem apparatus (closed circuit)	1No.
2.	Venturi meter and Orifice meter apparatus (closed circuit) With all accessories (Combined or Individual)	1No.
3.	Pipe Friction apparatus (closed circuit) with all accessories	1No.
4.	Orifice and Mouth piece apparatus (closed circuit) with all Accessories (Combined or Individual)	1No.
5.	Notch apparatus (closed circuit) with all accessories	1No.
6.	Reciprocating Pump Testing Rig with all accessories	1No.
7.	Centrifugal Pump Testing Rig with all accessories	1No.

Web-based/Online Resources		
FLUID PROPERTIES & MEASUREMENT OF PRESSURE		
Properties of fluids	:	https://youtu.be/TgD3nEO1iCA?si=xUdoTsbCepyY_tBd
Types of pressures	:	https://youtu.be/ikt-MxC3_1o?si=kitMRCScKWAQ4n2-
Types of flow	:	https://youtu.be/OfViSGNSf4o?si=921H2Aqvt8xhiVZV
Total Energy and Total Head	:	https://youtu.be/95vwYGJ3E48?si=LLB51FVO8VFa16MG
Flow through Venturi meter and orifice	:	https://youtu.be/kcPawgvFehI?si=XsUjJ3wZ9YLKWyej
FLOW THROUGH ORIFICES AND MOUTH PIECES		
Flow through orifice - Co-efficient of Discharge by Time fall-Head method.	:	https://youtu.be/wdjmQ3JoP34?si=AKglGUnVZ6jHD3zC
Flow through cylindrical mouth piece - Co-efficient of Discharge by Timing fall in head method	:	https://youtu.be/dHSb0Z80O4I?si=GVA5lsmS_jwRH20x
Flow through cylindrical mouth piece - Co-efficient of Discharge by Constant head method	:	https://youtu.be/mqaUXV0kAGs?si=ohIydr-jjRgsm2sO
FLOW THROUGH PIPES		

Major losses and Minor losses through pipes	:	https://youtu.be/nLtnJ6DCpok?si=1JJ6_pYyeAa-FPci
Determination of friction factor in flow through pipes	:	https://youtu.be/f83D4h2LN4I?si=MYlUDLYy-WPVWs2M
pipes in parallel flow / series flow	:	https://youtu.be/vXeo7IyjrOk?si=CSwxRH4k_ae-LgH1
FLOW THROUGH NOTCHES		
Types of notches	:	https://youtu.be/Rwl1mu0TJmE?si=jI49QuLiDJP1p3Lu
Co-efficient of Discharge for Rectangular Notch	:	https://youtu.be/_kcqXDfk1a8?si=PKV6NwZQaUyQK7Sz
Co-efficient of Discharge for Triangular Notch	:	https://youtu.be/CWSYJ_zOAxQ?si=Maqibp-NoEbsTJ_K
Co-efficient of Discharge for Trapezoidal Notch	:	https://youtu.be/ryg5JZJR7no?si=_wwMi2oBS27X373G
PUMPS		
Classification of pumps	:	https://youtu.be/ri5QydTx3AQ?si=Fb_FMN_F3YBMmzoI
Working of the Reciprocating pump	:	https://youtu.be/41vb6T42_Tk?si=4o2AUphNZVtyIDlO
Working of the Centrifugal pump	:	https://youtu.be/zwSWHrVBQls?si=KP5KyL-jIjDWEUeD

CEH376	Material Testing Lab	L	T	P	C
Practicum		1	0	4	3

Introduction:

- Civil Engineering diploma holders have to supervise construction of various types of civil works involving, the use of various materials like stones, bricks and tiles, cement and cement-based products, lime, timber and wood-based products, paints and varnishes, metals and other miscellaneous materials.
- The students shall acquire knowledge regarding the characteristics, uses and availability of various building materials and skills in conducting tests as per BIS as well as international standards to determine the suitability of materials for various construction purposes.
- Strength and durability are the main parameter for any construction material. This Laboratory experiments provide a hands-on experience with the testing of civil Engineering materials such as cement, steel, Timber, non-ferrous materials, ceramic materials, fine and coarse aggregates used in construction activities. Tensile, Compressive, shear and flexural strength are main strength parameter for any construction material. Water absorption characteristic of materials also an important parameter in strength and durability point of view.

Course Objectives:

- This course is designed to conduct standard tests on various construction materials and specimens as per the Indian standard (IS code)and ASTM standards.
- Since the materials used in construction shall withstand all loads acting on it throughout the life of the structure and durable.
- Hence the students are expected to learn and have to perform Hands on training through laboratory practice.

Course Outcomes:

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

CO1 Understand and explain the fundamental mechanical properties of construction materials including tensile, compressive, shear, torsional, impact strength, and hardness.

CO2 Perform standard laboratory tests to determine the mechanical properties of materials such as tensile strength, compressive strength, shear strength, torsion, impact resistance, and hardness for metals and construction materials.

CO3 Evaluate physical properties of construction materials including cement fineness, setting times, aggregate crushing value, impact value, abrasion, water absorption, elongation, flakiness, and angularity indices.

CO4 Analyze test data to assess the suitability and quality of construction materials for engineering applications.

CO5 Develop skills in conducting material testing experiments following standard procedures and interpret results for practical civil engineering applications.

Pre-requisites:

Basic knowledge on Civil Engineering Construction Materials

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	2	3	-	1	-	3	1
CO3	-	-	2	3	2	-	-	-	-
CO4	-	-	-	-	-	-	1	-	-
CO5	-	-	-	-	2	-	1	3	3

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

Instructional Strategy:

- Teachers shall deliver theoretical knowledge on each test and standard procedures to perform the test for better understanding and importance of the particular Test on materials.
- Teachers shall Inculcate students on preparing specimen / samples as per the standard procedure and the same shall be demonstrated.

CEH376	Material Testing Lab	L	T	P	C
Practicum		1	-	4	3

THEORY

UNIT-I	CONSTURCTION MATERIALS-INTRODUCTION	
Introduction to Strength and durability of materials- Direct Tensile strength -stress strain relation for ductile materials-Direct Compressive Strength-Flexural strength-Deflection of beams-Bending Compression-Bending tension-split tensile strength-Torsional strength- shear strength-impact strength-Hardness of materials.		7

UNIT-II	CONSTRUCTION MATERIALS -PROPERTIES	
Cement -types of cement- water cement ratio-consistency-Fineness of cement-Initial setting time and final setting time-Bulk Density-Specific gravity- Importance of Crushing value of aggregates-Impact value- Attrition and abrasive value of aggregates- Water absorption of construction materials- Effect / Impact of water absorption-Elongation index-flakiness index and angularity index of aggregates.		8

PRACTICAL EXERCISES

Practical Exercises.

1. Conducting Tensile test on mild steel /Deformed bars and determining yield strength and finding important parameters.
2. Conducting compression test and determining direct compressive strength on (i)wooden cube (ii)Brick/ Fly ash brick (iii) Masonry block (iv)Paver blocks (Any two shall be given in Examination).
3. Conducting double shear test on Mild steel bar and finding the shear value.
4. Conducting Torsion test on Steel bar and finding its Modulus of rigidity.
5. Conducting an Impact test on brittle and ductile material by performing Izod/Charpy tests.
6. Conducting Hardness test and finding Brinnel's / Rockwell's hardness number on (i)Mild steel (ii)Brass (iii)Aluminium

15X4=60

7. Conducting deflection test on simply supported beams and finding its young's modulus value on (i)Wooden and (ii)Steel 8. Conducting fineness test on cement by Sieve analysis (OR) Blain's Air permeability apparatus. 9. Conduct Water absorption test on (i)Brick/Fly ash brick (ii) Coarse aggregates. 10. Determination of bulk density and Specific gravity of (i)Fine aggregate and (ii)Coarse aggregate. 11. Conducting attrition test on coarse aggregate by Deval's (OR) Los angels method. 12. Conducting abrasion test on aggregate by Dorry's method. 13. Conducting Crushing test on coarse aggregate and finding the crushing value of aggregate. 14. Conducting Impact test on coarse aggregate and finding the impact value of the aggregates. **15.** Determination of Elongation Index, Flakiness index and angularity index of aggregates.	
TOTAL PERIODS	**75**

Suggested List of Students Activity:

Student shall prepare specimen / sample of the construction material as per the testing standards and procedure.

Text and Reference Books:

1. M.S.Shetty,"Concrete technology, Theory and Practice "S.Chand&Company Pvt .Ltd, Seventh revised Edition,2013.
2. Indian Standard, IS 383:2016, Coarse and Fine aggregates for concrete-specification.
3. Indian Standard, IS 456:2000, Plain and Reinforced cement concrete.
4. Indian Standard, IS 2386(part-1) :1963, Methods of test for aggregates for concrete.
5. Indian Standard, IS 2386(part-3) :1963, Methods of test for aggregates for concrete.

Web-based/Online Resources:

1. American Society for testing and Materials (ASTM) standards
   https://www3.epa.gov/hudson/pdf/sedc_2004-2005_append.pdf

2. Bureau of Indian standards
   https://www.services.bis.gov.in/php/BIS_2.0/dgdashboard/Published_Standards_new/revised_standards

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)

- Universal testing machine (UTM)-Capacity 400 KN and above capacity with accessories with double shear arrangement-1No.
- Compression Testing Machine (CTM)1000 KN and above capacity-1No.
- Torsion testing Machine-1No.
- Impact Testing machine for Izod /Charpy test--1No.
- Rockwell cum Brinell harness testing machine-1No.
- Floor type deflection test arrangements magnetic stand, deflection gauge, weights and
- Beams made up of different materials-1No.
- Weighing balances with required capacity and accuracy--1No.
- Sieve sets for Cement IS sieve No.9 (90 Micron) made up od brass with 20cm dia. -1No.
- Blains Air permeability apparatus--1No.
- Deval's attrition testing Machine /Los Angeles abrasion testing machine--1No.
- Dorry's abrasion testing machine--1No.
- Metal Containers of 1lit,3 lit,5 lit,10 lit and 20 lit capacity-1No.
- Aggregate impact testing machine-1No.
- Aggregate crushing value apparatus-1No.

IV SEMESTER

CEH401	Mechanics of Structures	L	T	P	C
Theory		4	0	0	3

Introduction:

Mechanics of structures is a fundamental subject in Civil engineering that deals with understanding the behavior of structures under various loads. It forms the backbone of designing safe and efficient structures. Study of structural behaviour, analysis and design is a principal part of civil engineering courses and is essential for professional accreditation. This subject enhances the structural analytical ability of the students. This subject is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering, helps in determining statics response of statically determinate and indeterminate structures. This course has been designed for Diploma civil engineering students or those interested in developing a deeper understanding of introductory structural analysis concepts and methods. The lectures cover the essential concepts and methods of structural analysis and provide examples demonstrating their applications.

Course Objectives:

On completion of the course, the students will be able to:

- Define and describe the basic concept and principle of structure Analysis.
- Analyze determinate and indeterminate structures using various methods.
- Gain a solid understanding of how structures behave Under various loads.
- To understand the different techniques for analysis of structures.
- Identify different types of structural elements and their behaviour.
- Ability to distinguish between determinate and indeterminate structures.
- Ability to compute and draw normal, shear and bending moment diagrams for beams and frames.
- Apply knowledge of mathematics and Engineering in calculating slope and Deflections.
- The column subjected to axial loads, buckling behavior will also helps the students in developing the basic concepts of structural analysis.

Course Outcomes:

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

CO1 Understand and apply concepts of slope and deflection of beams using area moment method and related formulae for various loading and support conditions.

CO2 Analyze fixed beams to determine fixed end moments, bending moment diagrams, and shear force diagrams using area moment method.

CO3 Apply the theorem of three moments to analyze continuous beams and draw shear force and bending moment diagrams for typical cases.

CO4 Analyze non-sway portal frames using moment distribution method to determine joint moments and bending moment diagrams.

CO5 Understand the behavior of columns and struts, apply Euler's and Rankine's formulae to calculate critical loads and design parameters for different column types

Pre-requisites: Mechanics of Materials, Engineering Mechanics.

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	-	-
CO2	-	3	3	2	-	-	1	2	-
CO3	-	-	3	2	-	3	-	-	-
CO4	-	-	-	-	3	-	-	-	2
CO5	3	-	-	-	1	-	-	-	2

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

Instructional Strategy:

This subject is introduced so that diploma holder in Civil Engineering may appreciate the concepts and principles of mechanics understanding the behavior of structures under various loads and are able to apply the knowledge gained through the subject for the design of simple and small components. Teacher should give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve the tutorial problems independently. Teacher may conduct weekly small quiz sessions to know the students' level of understanding and if need be teacher may reinforce the concepts and principles related to mechanics of structures elements/members of building components.

CEH401	Mechanics of Structures	L	T	P	C
Theory		3	0	0	3

UNIT I	**SLOPE AND DEFLECTION OF BEAMS**	
	Deflected shapes / Elastic curves of beams with different support conditions – Definition of Slope and Deflection- Flexural rigidity and Stiffness of beams- Mohr's Theorems – Area Moment method for slope and deflection of beams – Derivation of expressions for maximum slope and maximum deflection of standard cases by area moment method for cantilever and simply supported beams subjected to symmetrical UDL& point loads. Numerical problems on determination of slopes and deflections at salient points of Cantilever Beam with maximum two point loads, udl throughout the beam, udl for the half length from fixed end and Combination of single point load and udl throughout the beam only- Determination of slopes and deflections at salient points of Simply supported beams with central point load, Two equal point loads at one third points, udl throughout the beam and Combination of central point load and udl throughout the beam only from first principles and by using formulae.	10
UNIT II	**FIXED BEAMS–AREA MOMENT METHOD**	
	Introduction to fixed beam - Advantages –Degree of indeterminacy of fixed beam- Sagging and Hogging bending moments- Points of Contra flexure. – Determination of fixing end(support) moments(FEM) by Area Moment method– Bending moment diagram(BMD)-Free BMD –Fixed BMD- Derivation of Expression for subjected to concentrated load at mid span, Single eccentric point load, udl throughout the beams. Numerical Problems for Fixed beams subjected to concentrated load at mid span, Single eccentric point load, Two equal point loads at one third points, udl throughout the beams, Combination of central point load and udl throughout the	15

	beam only. Drawing SF and BM diagrams for Fixed beams with supports at the same level (sinking of supports or supports at different levels are not included)	
UNIT III	**CONTINUOUS BEAMS–THEOREM OF THREE MOMENTS METHOD**	
	Introduction to continuous beams-Advantages–Deflected shapes of continuous beam-Degree of indeterminacy of continuous beams with respect to number of spans and types of supports –Simple/ Fixed supports of beams-General methods of analysis of Indeterminate structures – Clapeyron's theorem of three moments–Application of Clapeyron's theorem of three moments for the following cases–Two span beams with both ends simply supported –Two span beams with one end fixed and the other end simply supported. Numerical Problems on Two span beams with both ends simply supported – Two span beams with one end fixed and the other end simply supported - Sketching of SFD and BMD for all the above cases.	10
UNIT IV	**PORTAL FRAMES – MOMENT DISTRIBUTION METHOD**	
	Introduction to moment distribution method- Carry over moment-Carryover factor and Stiffness factor (Derivation not required)-Distribution moment-Distribution factor—Stiffness Ratio or Relative Stiffness- Concept of distribution of un balanced moments at joints - Sign conventions, Definition of Frames– Types–Bays and Story - Sketches of Single/Multi Story Frames, Single/Multi Bay Frames- Portal Frame– Sway and Non- sway Frames-Deflected shapes of Portal frames under different loading / support conditions-Numerical problems of Non sway (Symmetrical) Portal Frames for Joint moments by Moment Distribution Method and drawing BMD only.	15
UNIT V	**COLUMNS AND STRUTS**	
	Columns and Struts–Definition–Short and Long columns–End conditions – Equivalent length / Effective length– Slenderness ratio – Axially loaded short	10

	column - Axially loaded long column – Euler's theory of long columns- Assumptions – Expression for Critical load of Columns standard cases of end conditions-Limitations of Euler's formula – Modes of failure of column-Buckling of column-Buckling load-crushing load-safe load- Factor of Safety– Expression of Rankine's formula for Crippling load of Columns - Simple problems for circular column, Hollow circular column, rectangular column, Single I section without cover plate only.	
	Total Periods	60

Suggested student activities

1. Quiz.
2. Group discussion.
3. Seminar.
4. Surprise tests.
5. Class assignments.

Reference Books:

1. S.Ramamrutham,"Theory of structures",Dhanpat Rai Publications,NewDelhi.
2. B.C. Punmia, Ashok Jain & Arun Jain, "Theory of structures", Laxmi Publications, 9th Edition, April1992.
3. S.B.Junnarkar,Mechanics of structures (Vol.I) Charator Publishing House Anand,Gujarat.
4. V.N.Vazirani & M.M.Ratwani,"Analysis of structures",Khanna Publishers,NewDelhi.
5. R.L.Jindal,"Elementary Theory of Structures",S.Chand Pvt.,Co.Ltd.NewDelhi.
6. Madhan Mohan Dass,"Structural Analysis" PHILearning Pvt. Ltd., NewDelhi.
7. CS Reddy,Basic Structural Analysis,Tata McGraw Hill Publishing Company.
8. Pandit and Gupta,Theory of Structures–I,McGrawHills.
9. West HH,Fundamental of Structural Analysis,WileyIndia.
10. DasMM,Structural Analysis, PHI.
11. ThandavamurthyTS, StructuralAnalysis,Oxford.
12. Muthuku, AzmiI,BasicStructuralAnalysis,IKInternationalPublisher.
13. C K Wang, IntermediateStructuralAnalysis,McGrawHill.
14. J kinney Sterling,IndeterminatestructuralAnalysis,Addison-Wesley.
15. Jain O.P.-Jain B.K.Theory & AnalysisofStructures(I&II).

16. Wang C.K.; Intermediate Structural Analysis;TataMcGraw Hill book Company ,NewDelhi.
17. Popov E.P.; Engineering Mechanics of Solids; Prentice Hall of India,NewDelhi.
18. Gere & Timoshenko; Mechanics of Materials;CBS Publishers & Distributors,Delhi.
19. Hibbler RC; Mechanics of Materials; Pearson Education.

Web-based/Online Resources:

SLOPE AND DEFLECTION OF BEAMS:

https://youtu.be/U0uj67OwF4U?si=pxxtxfYoxP4Of3xc

FIXED BEAMS–AREA MOMENT METHOD :

https://youtu.be/0iIvT8x01wI?si=57CGtfvWi5LO2CZk

CONTINUOUS BEAMS– THEOREM OF THREE MOMENTS METHOD :

https://youtu.be/pk6z6STv_uw?si=TnKEFKJDaNoFv5hT

PORTAL FRAMES

MOMENT DISTRIBUTION METHOD:

https://youtu.be/xSDpRiTaoLg?si=ySvDfTcGq0GXQL0h

COLUMNS AND STRUTS:

https://youtu.be/hwpGAxa8UoI?si=vMGt1P20H_hTL4DO

CEH402	Transportation Engineering	L	T	P	C
Theory		3	0	0	3

Introduction:

Construction of roads is one of the areas in which diploma holders in Civil Engineering get employment. These diploma holders are responsible for construction and maintenance of highways. Basic concepts of road geo-metrics, surveys and plans, road materials, construction of rigid and flexible pavements find place in this course.

In addition, this subject will cater the needs of those technicians who would like to find employment in the construction of railway tracks, airport and harbour. The subject aims at providing broad based knowledge regarding various components and construction of railway track, airport and harbour components.

Course Objectives:

The objective of this course is to

- Make the students learn the basics of transportation engineering.
- Get knowledge about the various types of roadways and its geometric design.
- Acquire knowledge about railways, rail components and its uses.
- Know the various types of stations, signalling and interlocking in railways.
- Study the general aspect of airport and harbour planning and design aspects.

Course Outcomes:

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

CO1 Understand the development, classification, and structural components of highways, including flexible and rigid pavements, and geometric design elements such as camber, super elevation, and curves.

CO2 Explain principles of highway alignment, construction methods, and equipment used in road construction, including Water Bound Macadam, bituminous, and cement concrete roads.

CO3 Describe railway engineering fundamentals including rail types, gauges, sleepers, ballast, and rail fastenings.

CO4 Understand railway station components, yards, turnouts, signaling systems, and interlocking principles.

CO5 Explain airport and harbour engineering concepts including airport planning, runway orientation, harbour layouts, coastal structures, and their functions.

Pre-requisites:

Knowledge of basic highway, railway, airport and harbour components.

CO/PO & PSOs Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	-	-
CO2	-	3	3	2	-	-	1	2	-
CO3	-	-	3	2	-	3	-	-	-
CO4	-	-	-	-	3	-	-	-	2
CO5	3	-	-	-	1	-	-	-	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.
- 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.

CEH402	Transportation Engineering	L	T	P	C
Theory		3	0	0	3

Unit I	HIGHWAY ENGINEERING	
	1.1 General-Development of Roads in India-Modes of transportation-Advantages of Roads –Requirements of an ideal road–Indian Road Congress-Classifications of Highways - Highway Pavements-Objectives-Types of Pavements–Flexible and Rigid Pavements- Comparative study of Flexible and Rigid pavements. **1.2** Road structure- Right of way– Width of formation-Road Camber-Super elevation-Sight distances–Road gradient-Road Curves-Horizontal curves-Vertical curves-Types- Widening of pavement on horizontal curves.	10
Unit II	**ROAD ALIGNMENT AND CLASSIFICATION**	
	2.1 Principles for ideal highway alignment-Factors affecting highway alignment-Excavating Equipment's-Tractor, Bulldozer, Grader, Scraper, Asphalt recycling equipment, Motor graders -Compaction Equipment's. **2.2** Water Bound Macadam roads, Bituminous Roads, cement concrete roads (Construction with sketches, Advantages and Disadvantages for these roads) - Surface dressing of Bituminous Roads-Types.	9
Unit III	**RAILWAY ENGINEERING**	
	3.1 Introduction to Railways -Classifications of Indian Railways –Rail Gauges–Requirements of an ideal rail-Types of rail sections - Coning of wheels- Creep of rails – Causes and prevention of creep- Ballast-Functions of Ballast-Requirements of ballast – Materials used as ballast. **3.2** Functions of Sleepers-Types of sleepers – Requirements of sleepers – Sleeper Density-Rail Joints-Types-Rail Fastenings-Fish plates - Fish Bolts-Spikes– Chairs and Keys-Bearing Plates-Blocks-Elastic Fastenings-Anchors and anti-creepers.	10
Unit IV	**RAILWAY ENGINEERING(Contd.)**	

4.1 Definition of station -Types of stations -Platforms–Passenger and Goods platforms -Definition of Yard–Types of yard-Level Crossings-Engine Shed- Triangles-Turntable-Traverses-Scotch Block-Buffer stops- Fouling marks. **4.2** Points and crossings-Turnouts-Right hand and left-hand turn outs-Crossings-Types of crossings - Objects of signalling –Types of signalling based on functions and location- Principles of interlocking.		08
Unit V	**AIRPORT AND HARBOUR ENGINEERING**	
5.1 Airport classification –airport planning: objectives, components, layout characteristics, -orientation of Runways and correction factors for runway as per ICAO stipulations, parking-wind rose diagram. **5.2** Harbour, port, satellite port, docks, waves and tides-planning of harbours: requirements, classification, location-harbour layout and terminal facilities-coastal structures: piers, break waters, wharves, jetties, quays, spring fenders, dolphins and floating landing stage.		08
TOTAL PERIODS		45

Suggested List of Students Activities:

- Presentation/Seminars by students on any recent technological developments in Highway Engineering.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Prepare Models of road geometric structures, points and crossing in railways etc.
- Visit near by road construction activities, Railway stations, Airports and Harbours.

Reference Books

1. S.K.Khanna and C.E.G Justo, “Highway Engineering”, Nem Chand and Bros,Roorkee.
2. Rangwala, “Highway Engineering” , Charotar Publishing House Pvt. Ltd., Edition 2010
3. Rangwala,“Railway Engineering”,Charotar Publishing House Pvt. Ltd., Edition 2010
4. S P Chandola,“A Text Book of Transportation Engineering” S Chand & Company Ltd.,
5. G V Rao, “Principles of Transportation & Highway Engineering” Tata McGraw-Hill Publishing Company Ltd.,
6. Saxena Subhash, C.and Satyapal Arora, A Course in Railway Engineering, Dhanapat Rai and Sons, Delhi, 1998.

7. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010.
8. Alkins and Harold," Highway Material", Prentice Hall, Pearson,2003.

Web-based/online resources:

Highway engineering:

https://youtu.be/3oNa9Z94Hiw?si=KaE7Cu7w6SvwVdek

https://youtu.be/5DGYmSXXStg?si=umVV7FDl6D2YtI01

https://youtu.be/oju-XCy-MJU?si=43SHkPRIgr0wh4sd

https://www.digimat.in/nptel/courses/video/105107220/L04.html

Railway Engineering:

https://youtu.be/37WMS483T7Y?si=0qkDRyZj6WeaTCcE

https://youtu.be/SC5GIAHuCQY?si=HhOK_zuWdM-SV_el

https://youtu.be/NznOF2ukTy4?si=URsRhChYEfpBCCn5

Airport and harbour engineering:

https://youtu.be/3YY9FUVtG-4?si=QjwhILSWM-APJl7V

https://youtu.be/kGMYOq-NUGg?si=ol07I-M-qd7w92Qo

CEH473	Soil Mechanics and Foundation Engineering	L	T	P	C
Practicum		1	0	2	3

INTRODUCTION

Civil Engineering diploma engineers are required to supervise the construction of roads and pavements, dams, embankments, and other Civil Engineering structures. As such, the knowledge of basic soil engineering is a pre-requisite for these engineers for effective discharge of their duties. This necessitates the introduction of Soil mechanics and foundation Engineering subject in the curriculum for Diploma Course in Civil Engineering. The subject covers only such topics as will enable the diploma engineers to identify and classify the different types of soils, their selection and proper use in the field for various types of engineering structures. The emphasis will be more on teaching practical aspects rather than theoretical concepts.

Course Objectives:

- To impart knowledge about the index, Engineering properties of soil and its classification
- To impart knowledge about the methods of determination of soil properties
- To Estimate permeability and shear strength of soil
- To know the various methods of compaction, consolidation and determination of field density of soil
- To know the various types of foundations, bearing capacity of soil and its importance
- To learn various soil sampling & soil stabilization and its methods

Course Outcomes:

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

CO1 Understand and determine basic soil properties, classification, and index parameters through laboratory tests.

CO2 Analyze permeability, total stress, effective stress, pore water pressure, and shear strength characteristics of soils.

CO3 Explain consolidation and compaction processes, perform field density and compaction tests, and

interpret results for soil improvement.

CO4 Identify types of foundations, understand bearing capacity theories, and evaluate soil bearing capacity for foundation design.

CO5 Understand soil sampling techniques and soil stabilization methods including materials and procedures used in practice

Pre-requisites:

Knowledge of Basics of soil properties and test methods.

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	-	-
CO2	-	3	-	-	-	-	1	2	-
CO3	-	-	3	2	-	3	-	-	-
CO4	-	-	-	1	3	-	-	-	2
CO5	-	-	-	-	1	-	-	-	2

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

Instructional Strategy:

The teacher while imparting instructions are expected to lay greater emphasis on the practical aspects rather than theory. To bring clarity regarding concepts and principls involved, teachers should organize demonstrations in the laboratories and fields. Efforts should be made in the practical classes that students perform practical exercises individually.

CEH473	Soil Mechanics and Foundation Engineering	L	T	P	C
Practicum		1	0	2	3

Unit I	**SOIL PROPERTIES AND ITS CLASSIFICATION**	
Introduction to Soil Mechanics-Origin of soil, three phase diagram - Definitions- Cohesive soil, Cohesion less soil, Void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters (Only formula) -Simple problems- BIS soil classification. **Practical**		4
1.	Determination of Specific gravity of sand	2
2.	To determine the moisture content of a given sample of soil	2
3.	Calculate Voids ratio and porosity of sand (If specific gravity, moisture content and degree of saturation value is given)	2
4.	Determine Grain size distribution of given soil sample by Sieve analysis	2
5.	Determination of liquid limit and Plastic limit of the given soil sample	2
Unit II	**PERMEABILITY, TOTAL STRESS AND SHEAR STRENGTH OF SOIL**	
Permeability -Definition, Factors affecting permeability, Determination of coefficient of permeability (Constant head and falling head method - Procedure only)-Darcy's law- Differentiate Darcy velocity and seepage velocity - Definition and Significance of total stress, effective stress, Pore water pressure, Capillary phenomena& quick sand condition - Shear Strength - Definition, Factors affecting shear strength of soil- Test on shear strength of soils (Name and uses only) **Practical**		4
6.	Determination of shear strength of soil by direct shear (Demonstration with models / video / Field visit)– Not for Exam	2
Unit III	**CONSOLIDATION AND COMPACTION**	

Consolidation-Definition, Factors affecting Consolidation - Compaction – Definition, Factors affecting compaction, Compaction Curve- Field methods of compaction - rolling, ramming and vibration. Suitability of different types of rollers - smooth wheel roller, sheep foot roller, pneumatic tyred roller. CBR Test Procedure only **Practical**		4
7.	Determination of field density of soil by sand replacement method **(OR)** Core cutter method.	3
8.	Determination of field density & optimum moisture content using Proctor's compaction test **(OR)** Modified proctor compaction test (Demonstration with models / video / Field visit)	4
Unit IV	**TYPES OF FOUNDATION AND BEARING CAPACITY OF SOIL**	
Types of foundation–Suitability and application of Isolated, strip, raft, Pile, well foundation. Uses of Pile groups and Sheet piles. Terzaghi's theory Assumption and Equation of bearing capacity for different footing (only formula) – Effect of water table on bearing capacity-Definition and significance of bearing capacity, ultimate bearing capacity, Net safe bearing capacity, Safe bearing capacity of soils and Negative skin friction - Factors affecting bearing capacity of soil. **Practical**		4
9.	Using Standard penetration test, identify various types of soil in Different layer and prepare detailed report (Demonstration with models / video / Field visit)	2
Unit V	**SOIL SAMPLING & STABILIZATION**	
Sampling and types of samplers, undisturbed, disturbed and representative samples-Area ratio, recovery ratio of samples - Materials used in soil stabilization-Geo-materials, Synthetic, natural polymers, Cement, Lime & Fly ash. Different methods of soil stabilization - Deep Mixing Method, Grouting Method, Mechanical Stabilization of Soil. **Practical**		4
10.	Using Auger boring (or) Any boring method, Identify various types of soil in Different layer. (Demonstration with models / video / Field visit) – Not for Exam	4
TOTAL		**45**

Suggested List of Students Activity:

- Visit any two-construction site, Examine different types of soil and its properties. Finally, the test results are compared with BIS standard.
- Visit any two-construction site, examine bearing capacity of soil using SPT/Pile load test
- Visit any one construction site, Examine suitable methods of soil stabilization / Ground improvement techniques

Text and Reference Books:

1. Punima B.C., Soil Mechanics & Foundation Engineering, Laxmi Publication Pvt. Ltd., New Delhi.
2. Gopal Ranjan & A.S.R Rao, 'Basics and Applied Soil Mechanics', New Age International
3. Arora K.R, 'Soil Mechanics and Foundation Engineering', Laxmi Publication, New Delhi.
4. Sehgal S.B., Soil Mechanics, C.B.S. Publishers & Distributors Pvt. Ltd., New Delhi.
5. Dr.Alam Singh, Basic Soil Mechanics & Foundations, C.B.S. Publishers & Distributors, New Delhi.
6. Gadi S.K., Soil Mechanics, B. Tech Publishers, Lucknow.
7. Sharma S.K., Soil Mechanics, Aisan Publishers, Muzaffarnagar.
8. Soil Mechanics and Foundations Engineering by Bharat Singh and Shamsher Prakash; Nem Chand and Bros, Roorkee,
9. Soil Sampling and Testing - A Laboratory Manual by Duggal, AK., Ramana, TR., Krishnamurthy, S; Galgotia Publications, Delhi
10. BIS Codes IS 6403 (latest edition) and IS 1498 (latest edition)
11. Shallow Foundations by NITTTR, Chandigarh

Web-based/Online Resources:

1. Video films on Geo-technical Laboratory Practices by Vinod Kumar; NITTTR, Chandigarh
2. e-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR, Chandigarh
3. https://swayam.gov.in
4. https://nptel.ac.in/courses/105/103/105103097
5. https://nptel.ac.in/courses/105106142
6. https://nptel.ac.in/courses/105101160
7. http://law.resource.org/pub/in/bis/S03
8. https://www.astm.org/standards/geotechnical-engineering-standards

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)

S.No.	**Description**	**Number required**
1	Pycnometer	**6 nos.**
2	Hot air oven with all accessories such as Glass cup, Desiccators, etc.,	**1No**
3	Weighing balance 100kg,1kg	**Each 1 No.**
4	Sieve test for fine aggregate made of brace 200mm Dia complete set.	**2 Sets**
5	Sieve test for coarse aggregate made of brass 200mm Dia complete set	**2 Sets**
6	Liquid limit and plastic limit devices with all accessories	**Each 2 Nos.**
7	Direct shear machine with complete accessories	**1No.**
8	Proctor's compaction test **(OR)** Modified proctor compaction test apparatus with all accessories	**2Nos.**
9	Sand replacement test Apparatus **(OR)**core cutter Devices with all accessories with all accessories	**1No.**
10	Auger boring (or) Any boring -Soil sampling Apparatus with all accessories	**1 No.**

CEH474	Concrete Technology	L	T	P	C
Practicum		1	0	4	3

Introduction:

Concrete is the most widely used building material. It is versatile, has desirable engineering properties, can be moulded into any shape. The knowledge of concrete's-controlled production, maintenance and testing is vital for a designer to ensure its optimal use. The need for better understanding the behavior of concrete, especially in challenging environmental conditions, it is required to have sound knowledge on selection of materials, mix proportioning and quality control methods.

Course Objectives:

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

- Understand the properties and strength of cement and aggregates.
- Investigate the properties of cement and aggregate by conducting laboratory test.
- Determine the properties and strength of fresh and hardened concrete
- Design the mix proportioning of concrete.
- Describe the Manufacture of concrete, Form work and Quality control.

Course Outcomes:

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

CO1	Illustrate the physical and chemical properties of cement and conduct standard tests on cement quality.
CO2	Describe the properties and classification of aggregates and water quality requirements for concrete.
CO3	Understand the properties of fresh and hardened concrete, including workability, strength, durability, and perform relevant tests.
CO4	Apply concrete mix design principles as per IS 10262 and perform testing for compressive strength and non-destructive evaluation.
CO5	Explain the manufacturing process, formwork requirements, and quality control measures for concrete construction.

Pre-Requisites:

Basic Science, Physical properties of various materials and their behavior.

CO-POs & PSOs Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	-	-
CO2	-	3	3	-	-	-	1	2	-
CO3	-	-	3	2	-	3	-	-	-
CO4	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	1	-	-	-	2

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

Instructional Strategy:

- The course content shall be delivered through lectures, PowerPoint presentations, and videos demonstrations and field visits
- The Activity criteria shall be conducted / executed by the student to be submitted to the faculty.
- The PRACTICE (Performance criteria) shall be conducted by the student and Report of work done to be submitted at the end of each session to the faculty.

CEH474	Concrete Technology	L	T	P	C
Practicum		1	0	4	3

Unit I	CEMENT	
	1.1 Chemical constituents: Bogue's compound & their properties- hydration of cement-Physical and chemical Properties of OPC cement-IS requirements of OPC & PPC. **1.2 Laboratory tests**: Fineness, Standard Consistency, Setting Time, Soundness, Compressive Strength -Different Grades of OPC-Storing of cement. **Exercises:** 1) Determination of normal consistency and initial setting time of the given cement. 2) Determination of soundness of cement by Le chatlier's method 3) Determination of Compressive Strength of cement.	6 3 3 3
Unit II	AGGREGATES AND WATER	
	2.1 Aggregates: Classification According to Size and Shapes **2.2 Fine Aggregates:** Properties- Size- Specific Gravity- Bulk Density- Water Absorption- Bulking-Fineness Modulus, Grading Zone of Sand, Silt content- Concept of Crushed Sand- Requirements of good aggregate. **2.3 Coarse Aggregates:** Properties- Size- Shape- Surface texture- Water Absorption- Soundness- Specific Gravity- Bulk Density- Fineness Modulus of Coarse Aggregate-Grading of Coarse Aggregates- Crushing Value- Impact Value- Abrasion Value-Requirements of good aggregate **2.4 Water:** Quality of Water- Impurities in Mixing water and Permissible Limits for Solids as per IS 456:2000. **Exercises:** 1) Determination of silt content in sand 2) Determination of bulking of River sand / M-sand	1 2 2 1 3 3

	3) Determination of fineness modulus of fine /coarse aggregate by sieve analysis.	3
Unit III	CONCRETE AND ITS PROPERTIES	
	3.1 Grades of concrete Different Grades of Concrete- Provisions of IS 456-Effect of Water Cement Ratio on Concrete- Duff Abram Water Cement(w/c) Ratio Law- Significance of w/c Ratio- Selection of w/c Ratio for Different Grades **3.2 Properties of Fresh Concrete** Workability-Factors affecting Workability of Concrete-Workability Requirement for different types of Concrete Works- Segregation, Bleeding, honey combing and Preventive Measures **3.3 Properties of Hardened Concrete** Strength, Durability, Impermeability of concrete **Exercises:** 1) Determination of workability of concrete by slump cone test 2) Determination of workability of concrete by compaction factor test **3)** Determination of workability by Vee- Bee Test	3 2 1 3 3 3
Unit IV	CONCRETE MIX DESIGN AND TESTING	
	Concrete Mix Design Concept of mix design- Factors influencing the choice of mix proportions- Methods of Mix Design- Procedural Steps of Mix Design as per IS-10262- Illustrative Example for Concrete Mix Design as per IS 10262:2019- Sampling and Acceptance criteria. **Exercises:** 1) Determination of compressive strength on concrete cubes 2) Non-Destructive Testing of Concrete-Rebound Hammer Test	9 3 3

Unit V	MANUFACTURE OF CONCRETE AND QUALITY CONTROL	
	5.1 Manufacture of concrete Concreting Operations-Batching-Mixing-Transportation, Placing, Compaction, Finishing, Curing	3
	5.2 Formwork for concreting-Types of form work for Beams, Slabs and Columns=Materials used for Formwork-Requirements of a Good Formwork Stripping time for Removal of Form work as per IS:456-2000	3
	5.3 Quality Control of Concrete Necessity of supervision-Errors in concrete construction-Check list before commencing concreting.	3
	Exercises: **1)** Determination of consistency of fresh concrete by flow table test. 2) Determination of carbonation depth on concrete	3 3
	TOTAL	75

List of Suggested Student Activities:

- Conduct field test on cement
- Compare properties of Manufactured sand with Natural River sand
- Study on Recycled coarse aggregate and prepare a report
- Visit the construction site and study the concrete operations and prepare a report
- Conduct a site visit to RMC plant /Cement plant and Prepare a report.

Reference

1) M.S.Shetty - Concrete Technology (Theory and Practice) - S.Chand& Company
2) Pvt. Ltd. New Delhi.
3) M L Gambhir - Concrete Technology - TATA McGraw-Hill Publishing Company
4) Limited, New Delhi
5) Vineet Kumar (Edited)- Concrete Technology - Khanna Publishers, New Delhi.
6) A.R. Santhakumar, Concrete Technology, Oxford University press

Web-based/Online Resources

https://archive.nptel.ac.in/courses/105/102/105102012/

https://www.youtube.com/watch?v=cx5gPKp9QEc&list=PLbMVogVj5nJQU7M0LdA77p_XaaWBJniNc

LIST OF EQUIPMENTS (for a batch of 30 students):

S. No.	List of Equipment required	Quantity Required
1.	Weigh balance-digital up to 10kg capacity with 1gm accuracy battery backup with 8 hours	1 no.
2.	Lechatlier apparatus	1 no.
3.	Compression testing machine ,1000 kN capacity	1 no.
4.	Cement mortar cube mould of size 70.6mm- 3 nos.	3 nos.
5.	Sieve test for coarse aggregate made of brass 200mm dia complete set	2 sets
6.	Sieve test for fine aggregate made of brass 200mm dia complete set	2 sets
7.	Slump cone apparatus	2 nos.
8.	Compaction factor apparatus	1 no.
9.	Vee Bee Consistometer	1 no.
10.	Cement mortar cube mould of size 150mm- 3 nos.	3 nos.

CEH475	Construction Practices	L	T	P	C
Practicum		1	0	4	3

Introduction:

Building Construction is a core subject in Civil Engineering, which deals with the construction processes of substructure, superstructure, Building finishes and maintenance of buildings. This course essentially imparts the knowledge of construction technology along with the processes involved in it and various construction equipment used for effective execution of various construction activities. This knowledge shall be used for effective and efficient up keeping of building after construction. This will enable the students to undertake the activities in comparatively shorter period of time.

Course Objectives:

- Describe the different types of foundations and Set out foundation in the field for spread footing and column footing for a building
- Describe the classification of stone masonry & brick masonry. State the different types of doors, windows, lintels & stairs.
- Describe the types of floors and roofs.
- Describe the different methods of pointing, plastering and termite proofing.
- Describe procedure of colour washing, white washing, painting and varnishing.
- Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a lintel cum sunshade, one way roof slab, beam, and column with footing
- Apply two or more coats of selected paint on the prepared base of a given wall surface
- Apply termite chemical on given damaged sample of timber

Course Outcomes:

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

CO1 Understand the fundamentals of structures including permanent and temporary structures, substructure and superstructure, and types of foundations with bearing capacity concepts.

CO2 Identify and apply knowledge of stone masonry and brick masonry, including types, bonds, and construction practices.

CO3 Explain waterproofing and damp proofing techniques, and understand the components and types of doors, windows, ventilators, and block masonry construction.

CO4 Understand the planning and construction of stairs, floors, roofing systems, and reinforcement detailing for structural elements like slabs, beams, columns, and footings.

CO5 Apply finishing practices including weathering course, pointing, plastering, painting, varnishing, and anti-termite treatments in construction.

Pre-requisites:

Basic Science, Basic Mathematics, Physical properties of various materials

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	1	2	-
CO3	-	2	1	2	-	3	-	-	-
CO4	-	-	-	-	3	-	2	-	2
CO5	3	-	-	-	1	-	-	-	2

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

Instructional Strategy:

NOTE 1: The course content shall be delivered through lectures, PowerPoint presentations, video demonstrations and field visits

NOTE 2: The Activity criteria shall be conducted / executed by the student to be submitted to the faculty.

NOTE 3: The PRACTICE (Performance criteria) shall be conducted by the student and observations and report to be submitted at the end of each session to the faculty.

CEH475	Construction Practices	L	T	P	C
Practicum		1	0	4	3
UNIT-I					
Theory Portion / Introduction					
1.1 INTRODUCTION TO STRUCTURES Permanent and temporary structures - Life of structures - Sub structure -super structure - load bearing structure - framed structure - concept of framed structure - advantages of framed structure. **1.2 FOUNDATION** Definition - objectives of foundation - Bearing capacity of soil – Definition - maximum/ultimate and safe bearing capacity - Bearing capacity of different types of soils - Requirements of a good foundation - Types of foundations - - Deep foundation: Pile, Types of piles- Causes of failure of foundation - Remedial measures		3			
1.3 Practical Exercises * 1. Prepare and develop a centre line plan, foundation Plan and set out spread footing in the field for the given line sketch of a building 2. Prepare and develop a centre line plan, foundation Plan and set out the layout of columns and footing in the field for the given line sketch of a building (Framed structure). 3. Study of Safe bearing capacity of soil by standard penetration test (SPT).		12			
UNIT-II					
Theory Portion / Introduction					
2.1 STONE MASONRY Definition - Common terms used -Classification of stone masonry - Rubble masonry - Ashlar masonry - points to be considered in the construction of stone masonry - Tools used(Names only). **2.2 BRICK MASONRY** Definition - Common terms used -Bond - Types Header, stretcher, English bond & Flemish bond –Features-Comparison-Points to be considered in the construction of brick masonry - Defects in brick masonry		3			

2.3 Practical Exercises * 4. Arrangement of bricks using English bond in one brick thick wall and half brick thick for right angled corner . 5. Arrangement of bricks using English bond in one brick thick wall and half brick thick for Tee junction . 6. Arrangement of bricks using English bond in one brick thick wall and Two brick thick wall square pillars.	12
UNIT-III	
Theory Portion / Introduction	
3.1 WATER PROOFING AND DAMP PROOFING Dampness - Causes of dampness - Effects of dampness – Dampproofing - Damp proof courses (DPC) - Water proofing coats for sump / overhead tank wall - Methods of grouting. **3.2 DOORS, WINDOWS AND VENTILATORS** Standard sizes of doors and windows - Location of doors and windows - Different materials used - Doors Component parts -Types – Windows- Types -Ventilators – Definition, purpose-Types. **3.3 BLOCK MASONRY CONSTRUCTIONS** Types of cement blocks-Consideration for use of hollow concrete blocks- Laying of hollow blocks-Compound walls in Block work.	**3**
3.4 Practical Exercises 7. Construct concrete block masonry wall of 1m height. 8. Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a Lintel cum sunshade. 9. Apply two or more coats of Water proofing coats for sump / overhead tank wall on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/ rollers adopting safe practices.	**12**
UNIT-IV	
Theory Portion / Introduction	
4.1 STAIRS Definition - Terms used - Location of stair- types	**3**

4.2 FLOORS AND FLOORING Floors - Definition - Types - Materials used - Selection of flooring. **4.3 ROOFS** Definition - Types of roofs - Technical terms – Types of trusses.	
4.4 Practical Exercises 10. Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a one-way roof slab. 11. Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for singly reinforced Beam. 12. Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a Column and footing.	**12**
UNIT-V	
Theory Portion / Introduction	
5.1 WEATHERING COURSE Weathering course – Purpose –Laying Procedure. **5.2 POINTING** Objectives - Mortar for pointing - Types of pointing **5.3 PLASTERING** Definitions - Objectives – Methods of plastering-Defects in plastering. **5.4 WHITE WASHING, COLOUR WASHING, DISTEMPERING,** **5.5 PAINTING & VARNISHING** White washing – preparation and application –Distempering- process and application-Painting –preparation and application. **5.6 ANTI-TERMITE TREATMENT** Definition - objectives and uses - Methods of termite treatment.	**3**
5.7 Practical Exercises 13. Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/ rollers adopting safe practices. 14. Plastering with cement mortar on the prepared base of a given wall surface for the area of 1m x 1m adopting safe practices. 15. Apply the relevant termite chemical on given damaged sample of timber.	**12**
TOTAL PERIODS	**75**

Suggested List of Students Activity:

- Prepare a report on stabilized mud block and porotherm block masonry construction.
- Study and present the standard size of doors, windows&ventilators for different types of buildings
- Study the suitability of staircases,ramps,elevators and escalators in different types of buildings.
- Study and present advanced surface finishing textures and its suitability
- Study and present advanced water proofing techniques and painting
- Visit a construction site and prepare a report of laying(before, during and after) floor finishes and roofing work

Text and Reference Books:

- B C Punmia, "Building Construction", Laxmi Publications
- P.C.Varghese, "Building Construction", PHI Learning Private Limited,New Delhi-110001
- Dr.J.Jha&Dr.S.K.Sinha,"Construction and Foundation ngineering",KhannaPublishers,Delhi
- S.C.Rangwala, "Building Construction", Charotar Publishing house,New Delhi.
- Bureau of Indian Standards, "Handbook of Functional Requirements of Buildings, (Sp-41&Sp- 32)", BIS 1987 and 1989

Web-based/Online Resources:

- www.nptel.ac.in
- http://thebooksout.com/downloads/%20%20of%20building%20materials%20bc%20punmia%20%20ebook
- https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)

S.No..	List of Equipment's	Quantity Required
1.	Pegs, thread, Hammer, Measuring tape, Lime powder	As required
2.	Steel rods, sprit level, straight edge, Trowel, string, plumb bob	As required
3.	Consumables like Bricks, steel rods, string. etc	As required
4.	Consumables like Water proof paints, anti-Termite chemical	1 liter each

CEH476	Estimation and Costing	L	T	P	C
Practicum		1	0	4	3

Introduction:

Students enrolled in the Civil Engineering diploma program are expected to acquire essential skills and knowledge in estimation and costing, critical for managing construction sites and overseeing development projects such as townships, residential colonies, and public buildings. Proficiency in estimation and costing involves a comprehensive understanding of various concepts, principles, and methodologies utilized in the construction industry. Throughout the course, teachers will utilize a combination of lectures, demonstrations, hands-on practical sessions, and field visits to facilitate learning and comprehension of estimation and costing principles. Emphasis will be placed on developing critical thinking, problem-solving, and decision-making skills essential for successful careers in the construction industry.

Course Objectives:

The objective of this course is to enable the student:

- Understand the fundamental ideas behind estimation and costing in construction projects.
- Recognize the different methods used for estimating construction costs.
- Prepare effective budget planning for construction projects.
- Expertise in preparation of reports and writing specifications for proposed works
- Prepare bill of quantities for proposed works
-

Course Outcomes:

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

CO1 Explain different types of estimates including approximate and detailed estimates and prepare approximate cost estimates using various methods.

CO2 Perform measurements, calculate material requirements, and prepare data for detailed estimates using standard data and schedule of rates.

CO3 Draft specifications for materials and works, and prepare construction reports including market rates and labour wages.

CO4 Prepare detailed estimates for civil engineering works using trade and group systems, and understand the duties of quantity surveyors.

CO5 Prepare bar bending schedules for various reinforced concrete structural elements accurately.

Pre-requisites:

Knowledge of specification, dimensions, units, conversions, masonry, Construction materials.

CO/PO & PSOs Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	-	2	-	-	1	2	-
CO3	-	-	3	2	-	2	-	-	-
CO4	-	-	-	-	3	-	3	-	2
CO5	1	-	1	-	1	-	1	-	2

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

Instructional Strategy:

- The teachers are expected to drive the attention of the students to improve the student's learning ability.
- Assist the students in learning and appreciating the concepts and objectives of estimating and cost analysis of the projects they come across.
- Making the students expertise in the subject by arranging suitable activities for all the topics.
- Activity based demonstration for better understanding.
- Guide the students to correct work on an activity where there could be source of errors.

CEH476	Estimation and Costing	L	T	P	C
Practicum		1	0	4	3

UNIT I	**INTRODUCTION**	
1	**1.1 ESTIMATE:** Estimation – Definition of Estimate – Approximate estimate – Detailed estimate - Main estimate - Revised estimate – Supplementary estimate – Sub estimate – Annual maintenance estimate – Repair estimate – Complete estimate. **1.2 APPROXIMATE ESTIMATES:** Necessity – Types – Plinth area method – Cubical content method –Service unit method – Typical Bay method. **Practical exercises:** 1. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by Plinth area method. 2. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by cubical content method. 3. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by Service Unit Method.	**3** **4** **4** **4**
UNIT II	**MEASUREMENTS & MATERIAL REQUIREMENTS, PREPARATION OF DATA**	

2	**2.1 MEASUREMENTS & MATERIAL REQUIREMENTS:** Units of measurements for works and materials – Degree of accuracy in measurements - Deduction for openings in masonry, plastering and white washing area – Painting co- efficient – out turn of works - workingout of materials requirements — cement, sand, bricks, aggregates etc. based on thumb rules for different works. **2.2 PREPARATION OF DATA** Data – Types – Main and sub data – Observed data – lead statement - Schedule of rates — Standard data book — Sundries — Lump sum provision – Preparation of data using standard data and schedule of rates. **Practical exercises:** 4. Prepare the list of items to be executed with units for detailed estimate of a given structure from the given drawing. 5. Prepare data for the given items of work with necessary sub data.	**3** **4** **4**
UNIT III	**SPECIFICATION AND REPORT WRITING**	
	3.1 SPECIFICATION Specification — Necessity — Types of specifications — Essential requirements of specifications – Specification for various materials like Cement, Sand, Brick, Timber, Reinforcement Steel, Stone Aggregate, Water - Specifications for various items of works — General Specifications for a building - Culvert - Concrete Roads . **3.2 REPORT WRITING:** Report writing – Definition – Necessity of report- Points to be considered while writing a report- Documents to accompany the report. **Practical exercises** 6. Prepare a report on market rates for given material, labour wages hire charges of tools &equipment required to construct the given structure. 7. Prepare detailed Specification for Earthwork, Foundation concrete, R.C.C in Beam, R.C.C in Slab and Column .	**3** **4** **4**

UNIT IV	**TRADE SYSTEM**	
	4. TRADE SYSTEM: Introduction - Taking off Quantities: Systems – Trade system – Group system – Methods – Long wall and Short wall method – Centre line method – Preparation of data – Lump sum provision and contingencies – Quantity surveyor – Duties – Essential Qualities. **Practical exercises** 8. Prepare detailed estimate for the given set of drawings using standard measurement sheet for load bearing residential structure using description of item from 1BHK building. 9. Prepare detailed estimate for the quantity of items of work from the given set of drawings using standard measurement sheet for RCC framed structure using description of item 1BHK building. 10. Prepare detailed estimate for the given Septic tank.	**3** **4** **4** **4**
UNIT V	**GROUP SYSTEM**	
5	**5. GROUP SYSTEM:** Advantages of group system – Taking off and Recording Dimensions – Squaring Dimensions- Abstracting or Working up–Billing– Abbreviations. - Dimension paper – Timesing, Dimension, Squaring, Descriptive column - Cancellation of Dimensions – Descriptions –Spacing of Dimensions – Order of taking off – Squaring the Dimensions - Method of Squaring –Checking the Squaring – Casting up the dimensions - Function of the Abstract – Order in the Abstract – Preparing the abstract – Casting and reducing the Abstract – Method of writing Bill – Checking the Bill. **Practical exercises** 11.Prepare detailed estimate for brick work for the given set of drawings using standard measurement sheet for load bearing residential structure (1BHK building).	**3** **4**

	12. Prepare detailed estimate for RCC for the given set of drawing using standard measurement sheet (1BHK building) 13. Prepare bar bending schedule for the given two way slab. 14. Prepare bar bending schedule for the given square column and square footing. 15. Prepare bar bending schedule for the given singly reinforced and doubly reinforced beams.	**4** **4** **4** **4**
TOTAL PERIODS		**75**

Suggested List of Students Activity:

1. **Site visits:** Organize visits to construction sites where students can observe different measurement methods, preparation of estimates and BOQ .
2. **Guest lecturers:** Invite industry professionals such as quantity surveyors, cost engineers, or project managers to deliver topics related to estimation and costing in construction projects.

Reference Books:

1) **Dutta, B.N.** , "Estimating and Costing in Civil Engineering", Tata McGraw Hill, New Delhi
2) **Rangwala, S.C.,** "Estimating and Costing in Civil Engineering", Charotar Publishing House, New Delhi
3) **Kohli, D.D.,** "Estimating and Costing in Civil Engineering", UBS Publishers' Distributors Ltd, New Delhi
4) **Chakraborty.M.,** "Estimating and Costing in Civil Engineering", Khanna Publishers, New Delhi
5) **L.S. Negi, J.S.Kharat.,** "Estimating, Costing and Valuation", Khanna Publishers, New Delhi
6) **Mahesh Varma, D. Chakraorty.,** "Estimating and Costing in Civil Engineering", Standard Book House, New Delhi

7) **Chandra, S.,** "Estimating, Costing, Specification & Valuation in Civil Engineering", Charotar Publishing House,New Delhi
8) **B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain.,** "Estimating, Costing, Specification & Valuation in Civil Engineering", Laxmi Publications, New Delhi
9) **Khan, P.,** "Estimating and Costing in Civil Engineering", S.K. Kataria & Sons,New Delhi
10) **Kulkarnai, S.V.,** "Estimating and Costing in Civil Engineering", Pune Vidyarthi Griha Prakashan, Pune

Web-based/Online Resources:

1. Estimation of Building - https://www.youtube.com/watch?v=lOUt8b-PzuU
2. How To Prepare Construction Cost Estimation Format In Excel For Projects - https://www.youtube.com/watch?v=iRFjOwaMYdA
3. How To Calculate Material Cost - https://www.youtube.com/watch?v=HpNLucXrc54
4. Estimation using Center Line Method - https://www.youtube.com/watch?v=grJ8YLOk8kI
5. Numerical on Bar Bending Schedule of Beam - https://www.youtube.com/watch?v=ckRMZbzBDG4
6. How to Takeoff and Use - https://www.youtube.com/watch?v=qmde_pRAjpM

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)
As required

V SEMESTER

CEH501	Design of RCC Structures (Limit State Method)	L	T	P	C
Theory		4	0	0	4

Introduction:

This is a core subject which covers broad elements of RCC design of various structural elements. Diploma holders in Civil Engineering will be required to supervise RCC construction. They may also be required to design simple structural elements and make changes in design depending upon the availability of materials (bars of different diameters).

This subject thus deals with elementary design principles as per Indian Standard practice IS:456 - 2000 by limit state method.

Course Objectives:

The objectives of the course is to enable the students to

- Analyse and design simple RCC elements like singly, doubly reinforced rectangular beams, and singly reinforced simply supported T-beams for flexure and shear.
- Design One way/ Two way simply supported slabs.
- Design Axially loaded Columns and Footings.

Course Outcomes:

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

CO1 Understand the concepts of Limit State Method of design, characteristic and design strengths of materials, partial safety factors, and design of singly and doubly reinforced rectangular beams for flexure.

CO2 Design rectangular beams for shear using limit state principles and plan dog-legged staircases as per IS codes.

CO3 Design singly reinforced T-beams and continuous beams for flexure using IS 456:2000 provisions and moment coefficients.

CO4 Design one-way and two-way slabs for strength and stiffness requirements, including checks for shear and deflection.

CO5 Design axially loaded short RCC columns and isolated column footings considering slenderness effects, reinforcement detailing, and shear requirements as per IS 456:2000.

Pre - requisites:
Mechanics of Materials and Mechanics of Structures.

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	3	-
CO2	-	3	-	-	1	-	-	-	-
CO3	-	2	-	-	1	-	-	-	2
CO4	-	-	-	3	-	-	-	3	-
CO5	-	-	3	-	-	-	-	-	-

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

Instructional Strategy

- This subject is introduced so that diploma holder in Civil Engineering may appreciate the concepts and principles of RCC structural elements of buildings and are able to apply the knowledge gained through the subjects of mechanics of materials and mechanics of structures. The design of simple structural elements like beams, slabs, column and footings will be demonstrate to the students to expose them in the field.
- Teacher should give simple exercises involving the applications of various concepts and principles being taught in the subject.
- Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve the tutorial problems independently and visit to local construction site to understand the behaviour and uses of structural elements.
- Teacher may conduct weekly small quiz sessions to know the students' level of understanding.

CEH501	Design of RCC Structures (Limit State Method)	L	T	P	C
Theory		4	0	0	4

UNIT I	**INTRODUCTION TO REINFORCED CEMENT CONCRETE STRUCTURES**	
	1.1 INTRODUCTION TO LIMIT STATE METHOD OF DESIGN IN CONCRETE Reinforced Cement Concrete Materials used in R.C.C and their basic requirement- Purpose of providing reinforcement-Different types and grades of cement and steel - Characteristic strength and grades of concrete as per IS 456 - 2000. Limit State Method - Concept -Advantages- Different limit states Characteristic strength and design strength of materials - Characteristic loads and design loads - Partial safety factors for loads and material strength - Limit state of collapse in flexure - Assumptions -Limiting values of neutral axis of singly reinforced section for different grades of steel - Moment of resistance of singly and doubly reinforced rectangular sections- Problems. **1.2. DESIGN OF RECTANGULAR BEAMS FOR FLEXURE** Design requirements-Effective spans of cantilever and simply supported beams - Breadth and depth requirements of beams - Control of deflection - Minimum depth requirement for stiffness-Minimum concrete cover to reinforcement steel for durability and fire resistance - Minimum and maximum areas/ spacing for main reinforcement and side face reinforcement as per IS 456 -2000- Development Length - Anchorage values of bends and hooks - Curtailment of reinforcements- Design bending moments - Design of singly and doubly reinforced rectangular beams (Cantilevers and Simply supported beams carrying udl only)- Problems.	**12**
UNIT II	**DESIGN OF RECTANGULAR BEAMS FOR FLEXURE AND SHEAR**	
	2.1DESIGN OF BEAMS FOR SHEAR	**12**

	Limit state of collapse in shear - Design shear strength of concrete - Design shear strengths of vertical / inclined stirrups and bent up bars - Principle of shear design - Critical sections for shear- S.F Coefficients specified by IS:456- 2000 - Nominal shear stress - Minimum shear reinforcement - Design of rectangular beams using vertical stirrups by limit state method. **2.2. PLANNING OF STAIRCASE** Types of stairs – Effective span of stairs as per IS code – Classification based on structural behaviour –standard dimensions- Planning of dog legged staircase.	
UNIT III	**DESIGN OF T-BEAMS AND CONTINUOUS BEAMS**	
	3.1 DESIGN OF T-BEAMS FOR FLEXURE Cross sections of Tee and L-beams- Effective width of flange- Neutral Axis and M.R of Singly Reinforced T-Sections- Design of singly reinforced T-beams for flexure-Problems on Simply supported T- beams carrying udl only. **3.2 DESIGN OF CONTINUOUS BEAMS FOR FLEXURE** Methods of analysis of continuous beams- Effective Span- Arrangement of Loading for Critical Bending Moments- B.M coefficients specified by IS:456-2000-Design of rectangular continuous beams (Singly Reinforced) using B.M. coefficients (equal spans & udl only) for sagging and hogging moments.	**12**
UNIT IV	**DESIGN OF SLABS**	

	4.1 DESIGN OF ONE-WAY SLABS Classification of Slabs Effective spans - Loads (DL and IL) on floor/roof slabs and stairs (IS:875-1987) - Strength and Stiffness requirements - Minimum and maximum permitted size, spacing and area of main and secondary reinforcements as per IS 456 - 2000- Cover requirement to reinforcements in slabs- Design of cantilever/simply supported one way slabs by limit state method - Check for shear and stiffness. **4.2 DESIGN OF TWO-WAY SLABS** Introduction -Effective spans -Thickness of slab for strength and stiffness requirements - Middle and Edge strips - B.M coefficients as per IS:456 for Simply supported and Continuous slabs - Design of simply supported two-way slabs.	**12**
UNIT V	**DESIGN OF R.C.C. COLUMNS AND COLUMN FOOTINGS**	
	5.1 DESIGN OF R.C.C COLUMNS Limit state of collapse in compression - Assumptions - Limiting strength of short axially loaded compression members - Effective length of compression members - Slenderness limits for columns - Classification of columns -Minimum eccentricity for column loads - Longitudinal and Transverse reinforcement requirements as per I S 456-2000 - Cover requirement - Design of axially loaded short columns with lateral ties. **5.2 DESIGN OF COLUMN FOOTING** Basic requirements of Footings-Types of R.C footings - Minimum depth below GL- Footings with uniform thickness and varying thickness (sloped footing) – Critical sections for BM, Transverse/Punching Shears – Minimum reinforcement - Development length, Anchorage, Cover, Minimum edge thickness requirements as per IS 456- 2000 – Design of Isolated square and rectangular footings.	**12**
	TOTAL	**60**

Suggested List of Students Activities:

- Visits to nearby construction site and study about
  - (i) Foundation and Footings
  - (ii) Column reinforcements
  - (iii) Grade beam and lintel level beam reinforcement arrangements
  - (iv) Reinforcement details for beams and slabs
- Study the bar bending details of structural drawings.
- Learning the reinforcement arrangements given in SP-34 (Hand book on concrete reinforcement and detailing)

Reference Books

1. B.C.Punmia "Limit state Design of Reinforced concrete" Lakshmi publications, Delhi.
2. P.C.Varghese "Limit state design of reinforced concrete" PHI Learning Pvt. Ltd
3. S.R.Karve and V.L Shah "Limit state theory and design of reinforced concrete" Pune VidyaGrihaPrakashan.
4. Dr.S.Ramachandra "Limit state design of concrete structures" Scientific Publisher
5. N.Krishnaraju "Reinforced concrete Design" New age International Publications.
6. S.S.Bhavikatti "Design of RCC and structural elements" New age International Publications.
7. IS 456 -2000, IS 875-1987, IS 800-2007, BIS.

Web - based/Online Resources

Limit state method	:	https://youtu.be/jhVh4qNa_x8?si=YNSfiPtXo1DDZANC
Analysis of singly reinforced beams	:	https://youtu.be/o4-EAjGhzSw?si=IlD2GPM_ZcvIqx3e
Design of flanged beams in flexure	:	https://youtu.be/BOtUb1yk8sI?si=RSfF6k9F_SHnZium
Design of slabs	:	https://youtu.be/TQLehidE6Hc?si=eTEtZDufiXFmvp9-
Design of columns	:	https://youtu.be/n-D56dTyiyk?si=SGY0E46YRd1LZucG

CEH582	Mechanical, Electrical and Plumbing services	L	T	P	C
Theory		3	0	0	3

Introduction:

- Diploma holders in Civil Engineering are expected to coordinate with Mechanical, Electrical and Plumbing works in a structure while construction.
- Apart from Civil Engineering, some of the topics dealing with HVAC, Electrical and Plumbing are discussed in this subject to impart theoretical knowledge to the students.

Course Objectives:

The objectives of the course are to enable the students to

- Mechanical systems encompass heating, ventilation, and air conditioning (HVAC), ensuring indoor comfort and air quality.
- Electrical systems for designing power distribution, lighting, and security systems, ensuring a safe and efficient electrical supply.
- Plumbing systems incorporated water supply, drainage, and fire protection systems, ensuring proper sanitation and safety measures.
- Calculate Heat load, Electrical panel schedule and assigning size of a pipe.

Course Outcomes:

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

CO1 Understand the scope, importance, and future applications of MEP services, and gain basic knowledge of building components and relevant software tools like AutoCAD and Revit.

CO2 Explain HVAC system design principles, components, duct design methods, and pipe sizing, including manual calculations and software applications.

CO3 Describe electrical system design, including wiring, load estimation, circuit breakers, protection systems, and use of electrical design software.

CO4 Understand plumbing system fundamentals, including water supply, drainage, venting, fire fighting systems, and pipe sizing as per relevant codes.

CO5 Perform calculations related to HVAC heat loads, electrical load estimation, and plumbing pipe sizing for building services.

Pre - requisites:

Environmental Engineering

CO/PO & PSOs Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2
CO2	-	3	-	-	-	1	-	-	2
CO3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	2	-	-	1	3	-
CO5	-	-	-	-	2	-	1	3	-

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

Instructional Strategy

- This subject introduced to the Diploma students to expose the MEP (Mechanical, Electrical, and Plumbing) works that will be installed in a building for effective functioning of various services.
- Nowadays, the diploma Engineers also expected to carried out these works during construction with the help of other services personnel. Hence this subject gains importance now to learn the basics of MEP.
- Faculty should give simple exercises involving the applications of various concepts and principles being taught in the subject.
- Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged / guided to solve the tutorial problems independently and visit to local construction site to understand the behavior and uses of MEP.

Faculty may conduct weekly small quiz sessions in every week to know the students' level of understanding.

CEH582	Mechanical, Electrical and Plumbing services	L	T	P	C
Theory		3	0	0	3

UNIT I	**INTRODUCTION TO MEP**	
	Introduction to MEP – MEP services - Scope, Importance and future application – Types of building - Introduction to AutoCAD, Revit software and other software's – Study of building components.	6
UNIT II	**HVAC SYSTEM DESIGN**	
	Introduction to HVAC- scope, importance and future- functions of HVAC systems – heating – ventilation and air-conditioning – Codes and standards – ASHRAE, ISHRAE, IMC- Ducts and its types, Duct fittings, Flexible ducts etc. Duct elbows selections, Vanes, dampers and their importance - Duct designing methods (manual calculations) using Equal friction/Velocity reduction method-Pipe sizing methods- Chilled water pipe sizing, Pump size – Introduction to Software's – MACQUAY, HAP, Trane Trace 700.	9
UNIT III	**ELECTRICAL SYSTEM DESIGN**	
	Introduction to Electrical system-Symbols-NEC codes-Types and selection of wiring systems, wires and cables - Lighting, power circuit -Types of Light fittings and power sockets- wiring diagrams- sensors and applications- Conduit Layout Design, Lighting and Power load estimation - Load balancing- Types and selection of Circuit Breakers and underground cables- UPS & Inverters- Fire protection and Alarm System - Earthing and lightning protection system- Introduction to software – Electrical system drafting (CAD) and modeling(Revit), Comcheck, Visual, Dialux.	9
UNIT IV	**PLUMBING SYSTEM DESIGN**	
	Fundamentals of plumbing system - fixtures, faucets & fixture fittings – IPC code and symbols - External & internal water supply and return system – Sanitary drainage system - vent pipe system - Storm water drainage system –	9

	Gas line - Fire Fighting Systems – Fire Extinguisher and Sprinkler System – Dry & Wet Riser Systems – Pipe selection and Sizing.	
UNIT V	**Calculation for HVAC, Electrical and Plumbing**	
	HVAC Heat Dissipation – Internal Heat Load – External Heat Load – Temperature differential – outside temperature – Inside temperature - Heat load calculation for a building. **ELECTRICAL for a building** Lighting, ceiling fan, receptacles watts - Panel schedules for a building. **PLUMBING** Velocity pressure - Pipe selection and Sizing for a building.	12
	TOTAL	45

Suggested List of Students Activities:

1. Visit to nearby construction site and study about
   (i) HVAC
   (ii) Electrical works
   (iii) Plumbing works
2. Study the MEP drawings.
3. Do MEP design for a small building.

Reference Books

1. Walter T. Grondzik, Alison G. Kwok and Benjamin Stein," Mechanical and Electrical Equipment for Buildings" Wiley Publisher.
2. A K Mittal," Electrical and Mechanical Services in High Rise Buildings" CBS Publishers & Distributors.
3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)," ASHRAE Handbook", ASHRAE.
4. Allan R. Hambley," Electrical Engineering: Principles & Applications", Pearson.

5. American Society of Plumbing Engineers (ASPE)," Plumbing Engineering Design Handbook, ASPE.
6. Building services M.N.Gangrade, P.V.Patil, Nirali prakasan Publisher.

Web - based/Online Resources	
Introduction to MEP Engineering	https://www.youtube.com/watch?v=zjfLuiMk16g
Introducing MEP (Mechanical, Electrical and Plumbing) in Civil Engineering	https://www.youtube.com/watch?v=FwGay2rhEFQ
MEP design basics - HVAC, Electrical, Plumbing & Fire fighting	https://www.youtube.com/watch?v=NcvwKxKzzmw
Electrical Basics	https://www.youtube.com/watch?v=bsdt310LESw
Electrical Systems in a Building	https://www.youtube.com/watch?v=Y3wLzo-nIX4
Plumbing Design Basics	https://www.youtube.com/watch?app=desktop&v=lgX9SH297qM&t=192s
Heat Load calculations	https://www.youtube.com/watch?v=6Z5ymsIdkh0
Pipe Size Calculation - Pipe Sizing and Selection	https://www.youtube.com/watch?v=sDxX89JZJdU

CEH583	Irrigation and Water Resources Engineering	L	T	P	C
Theory		3	0	0	3

Introduction:

Diploma holders in civil engineering have to supervise the construction, repair and maintenance of canals, head works, cross drainage works, regulatory and other works. Some of diploma holders are also engaged for preventing water logging and irrigation by various methods. This subject imparts knowledge regarding basics of Irrigation, Methods of Irrigation, soil water plant relationship, Crop water Requirement, Hydrology, Ground water, constructional features of head works, cross drainage works, causes and prevention of water logging.

Course Objectives:

The objectives of the course is to enable the students to

- Understand the concept of necessity of irrigation in India
- Recognize different crops and their water requirements
- Know about rainfall and runoff
- Understand the components of hydrological cycle and hydrograph.
- Understand the occurrence of ground water and ground water exploration methods.
- Know about measurement of rainfall and read rain gauges and hydrographs
- Monitor construction and maintenance work of canal and canal linings
- Supervise maintenance and construction work of canal head works and cross regulators

Course Outcomes:

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

CO1 Explain the concepts of irrigation, its necessity, benefits, ill-effects, and various methods of irrigation including surface, subsurface, drip, and sprinkler irrigation.

CO2 Understand soil-water-plant relationships, calculate water requirements of crops, and analyze irrigation

efficiencies and cropping patterns.

CO3 Describe hydrological cycle components, measure precipitation, analyze rainfall-runoff relationships, and understand groundwater resources and exploration techniques.

CO4 Classify dams, spillways, and diversion headworks, understand their components, functions, and design considerations.

CO5 Design irrigation channels, understand canal lining, water logging issues, and describe cross drainage and canal regulation works.

Pre-requisites: Nil

CO/PO & PSO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2
CO2	-	3	-	-	-	1	-	-	2
CO3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	2	-	-	1	3	-
CO5	-	-	-	-	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.

CEH583	Irrigation and Water Resources Engineering	L	T	P	C
Theory		3	0	0	3

UNIT I	**IRRIGATION AND ITS METHODS**	
	1.1 INTRODUCTION Definition of Irrigation – Water resources in India – Necessity - Benefits of Irrigation – Ill-effects of Irrigation – Types of Irrigation - Command area development - Impact of irrigation on environment **1.2 METHODS OF IRRIGATION** Function of Irrigation water – Standards of Irrigation water - Methods of applying water to crops – Surface irrigation - Uncontrolled flooding – Free flooding – Contour Laterals – Border strip method – Check flooding – Basin flooding – Zig-Zag method – Furrow method – Contour farming – Sub-Surface Irrigation – Micro irrigation - Drip Irrigation – Sprinkler irrigation.	**3** **6**
UNIT II	**SOIL WATER PLANT RELATIONSHIP AND WATER REQUIREMENTS OF CROPS**	
	2.1 SOIL - WATER PLANT RELATIONSHIP Soil-water plant relationship - Soil moisture contents- Depth of soil water available to plants - Infiltration - Permanent and Ultimate Wilting point – Soil Fertility. **2.2 WATER REQUIREMENTS OF CROPS** Depth and Frequencies of Irrigation - Duty and Delta of water - Factors affecting duty - Problems - Command area and Intensity of Irrigation - Consumptive use of water and Evapo-Transpiration - Irrigation Efficiencies - Problems - Crops and crop seasons in India - Cropping pattern - Crop Rotation - Assessment of Irrigation water.	**3** **6**
UNIT III	**HYDROLOGY AND GROUND WATER**	
	3.1 HYDROLOGY	**6**

	Introduction - Definition -Application of Hydrology in engineering - Hydrological cycle - Precipitation - forms of Precipitation - measurements of rain fall - Rain gauge - Types of rain gauges - Rain gauge network - Mean rainfall over a drainage Basin - Methods - Radar and Satellite Measurements of rainfall runoff -Estimation of runoff - Losses - Hydrograph - Unit Hydrograph - Uses **3.2 GROUND WATER** Ground water resources- Zones of Ground water-Aquifer - Types- Terms used - porosity, permeability, yield, specific yield, specific retention, coefficient of storage, specific capacity - Measurement of yield of well - Pumping test- Recuperation test- Ground water exploration.	**3**
UNIT IV	**DAMS SPILLWAYS AND DIVERSION HEAD WORKS**	
	4.1 DAMS AND SPILLWAYS Classification of Dams – Comparison of Earthen and Gravity Dams - Earthen Dams – Components and their function, typical cross section - Types of failures of earthen dams and remedial measures - Gravity Dams - Typical cross section - Drainage gallery – Spillways –Definition, function, location and components – Types. **4.2 DIVERSION HEAD WORKS** Diversion Head Works - Components, layout, function and types - canal head regulator, silt excluders and silt ejectors. Barrages – components and their function - Difference between weir and barrage.	**6** **3**
UNIT V	**IRRIGATION CHANNELS CROSS DRAINAGE WORKS AND CANAL REGULATION WORKS**	
	5.1 DESIGN OF IRRIGATION CHANNEL Canals - Classification of canals - Design of the most economical canal section – Comparison of Kennedy's silt theory and Lacey's regime theory - Canal lining – Definition - Types and advantages of canal lining - Properties of good canal lining material – Water Logging – Causes of Water-Logging – Remedial Measures. **5.2 CROSS DRAINAGE WORKS AND CANAL REGULATION WORKS**	**6**

	– Cross Drainage Works (CD Works) – Types of CD works – Canal Fall – Canal Escapes – Cross regulator and Distributary head regulator - Canal Outlet.	**3**
	TOTAL	**45**

Suggested List of Students Activities:

- Presentation/Seminars by students on any recent technological developments based on the Irrigation
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Prepare Models of dams/ spillways
- Compare various irrigation methods and identify the suitable irrigation method for the various crops.
- Presentation/Seminars by students on the necessities of cross drainage works and canal regulation work

Reference Books

1. Irrigation and water power Engineering B.C. Punmia
2. Santhosh Kumar Garg, Hydrology and water resources engineering, khanna publishers, Delhi.
3. K.Subramanya, Engineering hydrology, Tata McGraw-Hill publishing company ltd., New Delhi.
4. Introductory Irrigation Engineering B.C. Punmia Laxmi Publication, Delhi.
5. Fundamental principle of Irrigation Engineering V.B.
6. Priyani Fundamental principles of Irrigation Engineering
7. Bharat Singh Irrigation Engineering. & Hydraulic structures
8. Principles of Irrigation Engineering S.K. Verma

Web-based/Online Resources

Introduction - https://youtu.be/ibzY0LjHu38 Soil

Water - https://youtu.be/mg6UoXcBkyA

Crop Water Requirements - https://youtu.be/e7pckUDQ9oI

Evapo-transpiration - https://youtu.be/tSA18XoqMVQ

Irrigation Efficiencies - https://youtu.be/rZ4c-nB0ukQ

Sprinkler Irrigation - https://youtu.be/tZ1K3PFF0NU

Drip Irrigation - https://youtu.be/aMPRw71MIyw

CEH584	Defects in Building and Remedies	L	T	P	C
Theory		3	0	0	3

Introduction: This course is framed to offer an inclusive introduction to the field of Construction and Maintenance of Civil Engineering Infrastructure to catering essential knowledge through various sub-disciplines with in this field. It is tailored to meet the educational requirements typically outlined in the syllabus for diploma studies in Civil Engineering. A diploma holder in Civil Engineering is expected to acquire the knowledge and training to supervise and construct the building and to detect the defects in building and remedies. They should also be aware of the maintenance of building in effective manner.

Course Objectives:

The objective of this course is to enable the students to,

- Classify the type of cracks.
- Understand the causes of cracks in building.
- Know the methods of maintenance of building.
- Examine the defects in building and
- Study the assessment methodology of damaged building.
- Choose the suitable repairing materials required for damaged building.
- Understand the methods and inspection technique required for damaged building.
- Have knowledge of repair and strengthening of RCC members.

Course Outcomes:

CO1 Identify and classify different types of cracks and defects in buildings, understand their causes, and recognize the importance of building maintenance.

CO2 Assess building defects using visual inspection and non-destructive testing methods such as rebound hammer, ultrasonic pulse velocity, and core sampling.

CO3 Apply inspection techniques and surveys to evaluate the extent of damage, corrosion, water leakage, deflection, and surface deterioration in concrete structures.

CO4 Understand various repair materials, their properties, selection criteria, and application methods for repairing RCC members.

CO5 Implement repair and strengthening techniques for RCC members including crack injection, jacketing, plate bonding, and use of FRP plates to restore structural integrity

Pre-requisites:

Construction Materials and Practice.

CO/PO & PSOs Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2
CO2	-	2	-	-	-	2	-	-	2
CO3	-	3	-	-	-	-	-	-	-
CO4	-	-	1	3	1	-	3	2	-
CO5	-	-	-	-	2	-	-	-	-

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

Instructional Strategy:

- Engage and Motivate: Teachers should actively engage students to boost their learning confidence.
- Real – world Relevance: Teachers are expected to physically show various causes of development of cracks while imparting the instructions. Students should be encouraged to collect the various reasons for the development of cracks and failure of RCC structure.
- Interactive Learning: Teachers are expected to organize demonstration and field visits to show about the various operations involved in the repair and

rehabilitation of RCC structures.

- Application – Based Learning: Throughout the course, a theory demonstrates – 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 the theoretical instructions, different activities pertaining to the simulated Environment, transitioning to real – world scenarios, when possible, like expect lectures, seminars, visits to Construction plant 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.

CEH584	Defects in Building and Remedies	L	T	P	C
Theory		3	0	0	3

UNIT I	CRACKS IN BUILDINGS AND MAINTENANCE	
Cracks – Definition - Reasons for cracks in concrete - Classification of cracks - Wall cracks - Micro cracks - Macro cracks - Plastic shrinkage cracks - Plastic settlement cracks - Drying Settlement cracks - Thermal cracks - Map cracks due to alkali aggregate reaction - Longitudinal cracks due to corrosion - Transverse cracks due to loading - Shear cracks due to loading. Maintenance – Definition - Objective of maintenance - Maintenance Services - Safety of Buildings - Classification of Maintenance – Names only.		9

UNIT II	DEFECTS IN BUILDING AND THEIR ASSESSMENT	
Defects – Definition - Damage assessment procedure - Visual observation - Sketches of typical defects found by visual inspection - Testing of concrete - Quality Control tests - Slump tests - Compression test - Non-destructive test - Rebound / Schmidt hammer test - Ultrasonic Pulse Velocity Test - Acoustic Emission Test - Cover thickness survey - Rapid Chloride Permeability Test –Sorptivity Test - Core sampling and testing – Precautions during core drilling.		9

UNIT III	METHODS AND INSPECTION TECHNIQUES	
Inspection – Definition - First Survey - Second Survey - Carbonation test - Corrosion of reinforcing bars - Assessment of cracks - Assessment of evidence of water leakage - Deterioration of concrete strength - Assessment of a large deflection - Assessment of surface deterioration - Third Survey - Corrosion of beam – Cracking - Water leakage - Large deflection - Surface deterioration.		9

UNIT IV	REPAIRING MATERIALS FOR RCC MEMBERS

Repair – Definition - Repair materials - Criteria for selection of repair materials - Methodology for selection of repair materials - Material properties - Factors affecting the selection of a repair material - Essential parameters for repair materials - Classification of repair materials - Patch repairing - Cement patching mortar and concrete - Polymer concrete and mortar - Epoxy resin mortar and concrete - Quick setting compounds – Ferrocement – SIFLON – SIMCON – Grouts – Shotcrete - Bonding agents.		9
UNIT V	**REPAIR AND STRENGTHENING OF RCC MEMBERS**	
Rehabilitation – Retrofitting – Definition - Crack injection repair to concrete structures - Epoxy resins - Polyurethane resins – Jacketing - Plate bonding - Strengthening of foundation - Techniques to restore original strength of Columns, Beam and Slabs – Stitching - Repair procedure for corrosion damaged elements - Treatment of distressed floor in Toilets / Kitchen - Strengthening solution using FRP Plates.		9
TOTAL		**45**

Suggested List of Students Activity (Ungraded):

- Prepare a report of a field visit to nearby construction site.
- Prepare a report of a field visit to nearby damaged building.
- Study the development of cracks in the existing building and prepare the report.
- Study the causes of collapse of existing building and prepare the report.
- Periodic class quizzes conducted on a weekly/fortnightly based on thecourse.

Reference:

- R.N. Raikar, Learning from Failures, Dhanpatrai & Sons (2008), New Delhi
- Jagadish, K.S, Reddy, B.V. Venkatarama & Rao, K.S. Nanjunda, Alternative Building Materials and Technologies, New Age Publisher (2007), New Delhi.
- Malcolm Hollis, Surveying for Dilapidation, Estate Gazette (1999).
- Lan A. Melvice, Repairs and Maintenance of Houses, Estate Gazette (1999)

- Dr.S.Thirugnanasambandam, Building repairs and maintenance, Annamalai University, Tamil Nadu.
- SP 25 (1984) – Hand book on causes and prevention cracks in building.

Web Reference QR Codes

- https://www.grin.com/document/371648?lang=en
- https://www.academia.edu/33846701/General_Building_Defects_Causes_Symptoms_and_Remedial_Work
- https://www.irjet.net/archives/V6/i3/IRJET-V6I31180.pdf
- https://www.bd.gov.hk/en/safety-inspection/building-safety/index_bsi_defects.html
- https://www.slideshare.net/SoumyaKhandelwal4/defects-in-buildings-remedies
- https://www.researchgate.net/publication/332375912_Defects_of_the_building_and_its_remediation_Case_study_Elementary_school_Vodnany
- https://www.hrpub.org/download/20220228/CEA4-14825945.pdf
- https://www.pinterest.com/pin/pdf-general-building-defects-causes-symptoms-and-remedial-intended-for-construction-deficiency-report--660410732846957045/
- https://www.scribd.com/document/357631538/2-Defects-Remedies
- https://www.slideshare.net/shivamtomar3/construction-defects-43141208
- http://eprints.utar.edu.my/2310/1/CM-2016-1101687-1.pdf
- https://issuu.com/warse/docs/ijeter01372015
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10113855/
- https://www.cell.com/heliyon/pdf/S2405-8440(23)02259-4.pdf
- https://www.rics.org/content/dam/ricsglobal/documents/standards/defectsand_rectification_archived.pdf
- https://www.planradar.com/construction-defect/
- https://www.tandfonline.com/doi/full/10.1080/09613218.2023.2277464?src=exp-la
- https://www.griffith.edu.au/__data/assets/pdf_file/0022/831217/Examining-Building-Defects-Research-Report-S-Reid-N-Johnston.pdf

- https://pdfs.semanticscholar.org/41f0/e08ee6d21fba110df18fea52069fede34953.pdf
- https://journals.utm.my/jurnalteknologi/article/view/8494
- https://www.sablono.com/en/blog/defect-management-software-construction
- https://www.concreteisbetter.com/wp-content/uploads/2013/06/Slab-Surface-Prevention-Repair-a.pdf
- https://www.lawteacher.net/example-essays/legal-liabilities-defects-construction-7252.php
- https://www.building.govt.nz/projects-and-consents/why-contracts-are-valuable/implied-warranties-and-defects/

CEH585	Urban Planning and Development	L	T	P	C
Theory		3	0	0	3

Introduction:

Urban planning and development also known as town planning, city planning, regional planning, or rural planning in specific contexts, is a technical and political process that focuses on the development and design of land use and the built environment. Urban planning focuses on the **physical layout** of cities, including buildings, roads, parks, and public spaces. It considers how different activities (residential, commercial, industrial) are distributed within the urban area. Urban planning aims to enhance the quality of life for residents by addressing social needs and equity. In the late 20th century, the concept of **sustainable development** gained prominence. It aims to meet present needs without compromising the ability of future generations to meet their own needs.

Course Objectives:

The object of this course is to enable the student to

- Introduction to Urban Planning and Development Understanding the basic terms & Principles of Town Planning.
- Gain Knowledge about housing agencies.
- Familiarize students with the Master plan and Deplaning.
- Students can able to understand the basic functions of Traffic Management.
- Awareness of advancements in town planning.

Course Outcomes:

CO1 Describe the principles, evolution, and objectives of town planning, including zoning, urban growth, and types of urban planning.

CO2 Analyze housing requirements, classify residential buildings, and understand slum characteristics and clearance programs.

CO3 Prepare and evaluate master plans and re-planning strategies for existing towns, including urban renewal and smart city concepts.

CO4 Understand urban road classifications, street systems, and traffic management techniques to address urban transportation challenges.

CO5 Explain building bye-laws, development control rules, and sustainable urban planning techniques including green buildings and remote sensing applications.

Pre-requisites:

Knowledge of basic Science

CO/PO & PSOs Mapping

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

CEH585	Urban Planning and Development	L	T	P	C
Theory		3	0	0	3

UNIT I	TOWN PLANNING PRINCIPLES	
	1.1 General - Evolution of planning - Objects of town planning – Economic justification for town planning - Principles of Town planning - Necessity of town planning – Types of Urban Planning **1.2** Surveys – Zoning - Origin of towns - Growth of towns — Stages in town development - Distribution of land - Forms of planning - Site for an ideal town - Requirements of new towns - Planning of a modern town - Cost of Town planning - Present position of Town Planning in India.	8

UNIT II	HOUSING AND SLUMS	
	2.1 HOUSING General - Importance of housing - Demand for houses - Building site - Requirements of residential buildings -Classification of residential buildings - Design of residential areas - Rural Housing - Agencies for housing -Investment in housing - HUDCO – CIDCO - Housing problems in India. **2.2 SLUMS** General - Causes of slums - Characteristics of slums - Effects of slums - Slum clearance - Problems in removing slums - Resources for slum clearance Programmes - The Indian slums.	10

UNIT III	MASTER PLAN AND RE-PLANNING OF EXISTING TOWNS	
	3.1 MASTER PLAN General – Objects – Necessity - Factors to be considered - Data to be collected - Drawings to be prepared - Features of master plan- Planning standards – Report – Stages of preparation – Method of Execution - Conclusion. **3.2 RE-PLANNING** General - Objects of re-planning – Analyzing the defects of existing towns- Urban renewal projects- merging of suburban areas– Decentralization - Satellite Towns –	10

Smart cities Planning- definition and features.		
UNIT IV	**URBAN ROADS AND TRAFFIC MANAGEMENT**	
4.1 URBAN ROADS General - Objects - Requirements of good city road – Factors to be considered - Classification of urban roads - Types of street systems - Through and By-pass roads - Outer and inner ring roads - Expressways -Freeways - Precincts - Road aesthetics. **4.2 TRAFFIC MANAGEMENT** General - Object - Traffic survey - Traffic congestion - Traffic control - Traffic diversion - Road junction - Parking - Traffic capacity of road - One way traffic - Road traffic problems - Use of islands and flyovers at crossings - causes of road accidents - Traffic signal - Road sign -Road marking.		10
UNIT V	**BUILDING BYE LAWS & SUSTAINABLE PLANNING**	
5.1 BUILDING BYE LAWS General-Objects of bye-laws- Importance of bye-laws – Function of local authority – Plot coverage –Set back- Floor space index- Development control rules –General rules of metropolitan Area –CMDA rules – Tamil Nadu Combined Development and Building Rules - 2019. **5.2 SUSTAINABLE PLANNING** Urban Development Missions in India - Sustainable Planning Techniques - Social Infrastructure - Green Buildings - Sustainable Building Planning - Urban Planning Using Remote Sensing - Industrial Corridors.		07
TOTAL PERIODS		**45**

Suggested List of Students Activities:

- Presentation/Seminars by students on any recent technological developments in Urban Planning and Development
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Presentation/Seminars by students on the Urban Development Missions in Ind

Text and Reference Books:

1. Town Planning - S.C. Rangwala,: Charotar Publisher (2011), Publisher
2. K.S.Rangwala and P.S.Rangwala,. "Town Planning ",Charotar Publishing House,15th Edition,1999.
3. Michael Hord, R. Remote sensing methods and application, John Wiley and Sons, NewYork, 1986.
4. National Building Code of India- Part-III.(2005).
5. Municipal and Panchayat bye-laws, CMDA Rules and Corporation bye-laws.
6. KA. Ramegowda, Urban and regional planning , University of Mysore
7. Principles and practice of town and country planning Lewis B. Keeble, Estates Gazette, University of Michigan, 2010

Web-based/Online Resource

TOWN PLANNING PRINCIPLES : https://youtu.be/6N-1KWw0-mQ?si=cwka_pup7-BZAyU0

HOUSING AND SLUMS : https://youtu.be/JRx6RapPJIs?si=OY9ZjXPAwm0zDUK7

MASTER PLAN AND RE-PLANNING EXISTING TOWNS:
https://youtu.be/KXaWHd34jPY?si=SaXVbl8oPqOR0CSN

URBAN ROADS AND TRAFFIC MANAGEMENT

https://youtu.be/RmtdMBpb6PA?si=0rOXjKhJuQUFYgkg

SUSTAINABLE IN TOWN PLANNING
https://youtu.be/XE_2DBCAOh0?si=qNXnaWtOeJukkeWY

CEH586	Building Bye-Laws and Statutory Drawings	L	T	P	C
Theory		3	0	0	3

Introduction:

This course provides an in-depth understanding of building bye-laws, regulations, codes, statutory drawings, Vaastu that govern the construction and maintenance of buildings. Students will learn about the legal framework, safety standards, and environmental considerations involved in building design and construction.

Course Objectives:

- Understand the fundamental principles of bye-laws in India.
- Explore the legal framework governing construction practices, including permit procedures and regulatory compliance.
- Gain insight into the role of regulatory bodies and their enforcement mechanisms in ensuring building safety and sustainability.
- Learn to interpret and apply structural design standards, fire safety regulations, and environmental considerations in building projects.
- Develop practical skills for navigating the complexities of building bye-laws through case studies and real-world scenarios.
- Acquire knowledge of ethical and professional responsibilities in upholding building regulations and safety standards.

Course Outcomes:

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

CO1 Understand the scope, applicability, and regulatory framework of building bye-laws including roles of authorities and classifications of buildings.

CO2 Explain the legal framework, compliance procedures, and approval processes for building permissions as per National Building Code and local regulations.

CO3 Describe safety and structural regulations including earthquake resistance, fire safety, exit requirements, and related standards.

CO4 Develop statutory drawings such as site plans, floor plans, elevations, and sections adhering to regulatory requirements and approval processes.

CO5 Understand principles of building planning as per Vaastu science and apply Vaastu remedies and corrections in building design.

Pre-requisites:

Knowledge of the basic Science, Engineering graphics

CO/PO Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	3	-	-	2	-	-	-
CO3	-	2	-	-	-	-	1	3	2
CO4	-	-	-	3	2	-	-	-	-
CO5	-	-	-	-	-	-	1	3	1

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

Instructional Strategy:

- To engage the students by explaining basic concepts applied in our daily life and real-world applications.
- To make the students understand the views by the use of 3D drawings and realistic approach.
- To explain about the laws and principles through real life situations to the students.

CEH586	Building Bye-Laws and Statutory Drawings	L	T	P	C
Theory		3	0	0	3

Unit I	Introduction to Building Bye laws	
1.1 Introduction – Scope and Applicability of bye-laws –Definition of terms –Role of regulatory bodies (BIS) and local authorities - Classification of buildings - Residential, commercial, industrial, and institutional buildings. 1.2 Special regulations for heritage structures and earthquake-prone areas - Written permission for development of land (layout) - Competent authority for approval.		8

Unit II	Legal Framework and Compliance	
2.1 Legal Framework Overview - Regulatory Bodies Role - Building Classification Systems - Types of Occupancies - Understanding Zoning Laws - Urban Planning Fundamentals – Development Authorities Functions - Compliance Importance. 2.2 Rules for obtaining building permission as per National Building Code - Submission of Building Plans -Application Process - Plan Scrutiny - Compliance Check - Approval Process - Issuance of Building Permission - Inspections and Monitoring – Completion Certificate - Occupancy Certificate - stability certificate for commercial and institutional buildings - Renewal and Amendments.		10

Unit III	Safety and Structural Regulations	
3.1 Structural design principles and standards - Compliance requirements for earthquake-resistant buildings - Standards for parts of building such as basement, wall, floor, roof, parapet, chimney - Exit requirements - Types of exits - Number and size of exits - Arrangements of exits - Passenger elevators or lifts.		8

3.2 Fire safety regulations and prevention measures - Fire resistance ratings for building materials - Fire resistance of a building or its structural and non-structural elements - Emergency evacuation procedures - fire safety equipment.		
Unit IV	**Statutory Drawings**	
4.1 Importance and purpose of statutory drawings - Overview of regulatory approval process - Types of statutory drawings - Site Plans - layout, dimensions, setbacks and site features - Floor Plans- layout of interior spaces, dimensions, room names - Elevations - exterior views of the building, material specifications -Sections - vertical views showing building components and heights. 4.2 Development of Site plan - Site survey and data collection - Plotting site boundaries, contours, and utilities - Creating a comprehensive site plan with all necessary details - List of forms required for Approval as per NBC (Names only).		10
Unit V	**Building Planning as per Vaastu Science**	
5.1 Definition - Importance of Vaastu - Five Elements and Directions - Concept of Pancha Bhutas (Five Elements) - Influence of directional energies - Significance of cardinal directions (North, South, East, West) - Site Selection and Evaluation - Criteria for selecting a suitable site. 5.2 Remedies for site defects and imbalances - Building Layout and Orientation - Principles of building orientation - Ideal placement of rooms, entrances, and utilities - Designing according to Vaastu - Vaastu Remedies and Corrections - Implementation of Vaastu in existing buildings.		9
TOTAL		**45**

Suggested List of Students Activity:

- Students have to submit a report after visiting a local building approval authority such as Town and Country Planning office.

- Students have to visit an Architect office and prepare a report on the learning.
- Students have to develop a comprehensive checklist of building bylaws at national, state, and local levels.
- Students have to identify and map zoning regulations and land use classifications in urban areas.
- Students have to analyse the layout, orientation and design elements of building related to Vaastu principles and discuss the effectiveness of Vaastu based design.
- Students have to prepare a building plan for a congested area in their locality by applying bye-laws and Vaastu sciences after doing site survey.

Text and Reference Books:

- National Building code – 2016
- Tamil Nadu Combined Development and Building Rules -2019
- Building Bye Laws and Regulations of India- A.N. Nirman
- Urban development Rules and Regulations – K.R.Sharma
- Understanding Building Bye -laws - K.U.Mistry
- The ancient science of Vastu I & II – Dr Jayashree Om

Web-based/Online Resources:

Introduction To Building Bye Laws

https://www.nobroker.in/forum/what-is-building-bye-laws/

https://www.99acres.com/articles/what-are-building-bye-laws.html

https://www.linkedin.com/pulse/building-bye-laws-planning-regulations-venkatanarayanan-p- s

https://housing.com/news/building-bye-law/?gad_source=1&gclid=Cj0KCQjw6PGxBhCVARIsAIumnWa9vS-sZfD3a2FXQp21UtDUQ70YrzMHrAQsk4m87GFZx9rrkHn5LOoaAtHBEALw_wcB

Legal Framework And Compliance

https://www.designingbuildings.co.uk/wiki/Classification_systems

https://www.rocketmortgage.com/learn/zoning-laws

https://blog.ipleaders.in/development-authorities-constituted/

https://onlineppa.tn.gov.in/document-needed

https://syedsmartdeal.com/navigating-the-building-plan-approval-process-in-tamil-nadu-a-comprehensive-guide/

Safety And Structural Regulation

https://www.firetechglobal.com/fire-safety-and-prevention-tips-and-guidelines/

https://www.britannica.com/technology/earthquake-resistant-construction

https://theconstructor.org/earthquake/earthquake-resistant-techniques/5607/?amp=1

https://ehs.fiu.edu/safety-programs/fire/evacuation-procedure/

https://dazenelevator.com/passenger-elevator-complete-faq-guide/

https://theconstructor.org/building/standard-dimensional-building-components/558031/?amp=1

https://www.youtube.com/watch?v=rfEwwIAj06g

https://www.youtube.com/watch?v=wyS2I7npvnA

Statutory Drawings

https://www.getpowerplay.in/resources/blogs/types-of-drawings-used-in-construction/

https://getasiteplan.com/site-plan/

https://www.nbaind.org/Downloads/Documents

https://fontanarchitecture.com/plan-section-elevation/

Building Planning as per Vaastu Science

https://www.mahimagroup.com/blog/what-is-vastu-shastra-and-its-benefits

https://www.planetayurveda.com/library/concept-of-pancha-bhutas-five-elements-and-human-body/

https://zeezest.com/astrology/the-influence-of-cardinal-signs-aries-cancer-libra-and-capricorn-5406

https://www.long-intl.com/blog/cardinal-change/

https://www.google.com/amp/s/www.magicbricks.com/blog/amp/vastu-shastra-home-design/121909.html

CEH577	Computer Applications in Civil Engineering	L	T	P	C
Practical		0	0	4	2

Introduction

Computers play a very vital role in present day life, more so, in all the professional life of engineering. In order to enable the students, use the computers effectively in problem solving, this course offers various engineering applications of computers in civil engineering.

Course Objectives

- To provide hands-on experience for the students with software's in structural analysis, design and estimating.
- To enable the students to do the practical problems by using the available application software packages.
- To impart the knowledge of 3D building modelling.

Course Outcomes:

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

CO1 Prepare electronic spreadsheets for estimation, quantity calculations, and structural parameter computations using formula bars and functions.

CO2 Analyze various RCC structures including continuous beams, portal frames, and roof trusses using structural analysis software such as STAAD. Pro, SAP2000, ETABS, and others.

CO3 Design simple RCC structures like 1 BHK residential buildings using software tools, applying engineering principles and standards.

CO4 Create detailed 3D drafting and modeling of RCC structures including plans, sections, and elevations using CAD and BIM software such as Autodesk Revit, ArchiCAD, and Civil3D.

Pre-requisites

- Students should have enough knowledge in Mechanics of Structures, Estimation and Costing, Design of RCC Structures subjects.

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	2	-	-	-
CO3	-	3	-	-	-	-	1	3	2
CO4	-	-	-	3	2	-	-	-	-

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

Instructional Strategy

- Align the lab activities with the overall course curriculum, ensuring that each lab session complements the theoretical concepts taught in lectures.
- Define clear objectives for each lab session.
- Provide step-by-step tutorials and hands-on practice sessions to familiarize students with available software.
- Regularly update lab materials, incorporate new technologies and software tools, and adapt teaching strategies based on student needs and industry trends.

CEH577	Computer Applications in Civil Engineering	L	T	P	C
Practical		0	0	4	2

Part A	**ELECTRONIC SPREAD SHEET USING SOFTWARE**	
1.	Prepare the Estimate and Abstract sheet with given data (provide all the measurement details) and calculate the quantity and Total Amount using formula bar.	4
2.	Calculate Effective depth "d" and Area of Steel "Ast" using Formula Bar for given singly reinforced section.	4
3.	Finding center of gravity; I_{xx} and I_{YY} of I, L, T and channel sections.	4
4.	Calculate Area and Elongation using formula bar	4
Part B	**ANALYSIS OF RCC STRUCTURES**	
Note:	Analyse the Structure using any one of the available Software Packages- Staadpro, ,SAP,etabs,Tekla,Cads3d etc.)	
5.	Carryout the analysis of Continuous Beam with given size Carryout	6
6.	the analysis of Portal Frame structure with given size Carryout the	6
7.	analysis of king post roof truss	8
8.	Carry out the analysis and design of 1 BHK residential house with given structure	8
Part C	**DRAFTING OF RCC STRUCTURES**	
Note:	Draw the Structure using any one of the available 3D drafting Software Packages – Autodesk Revit Architecture, ArchiCAD, Autodesk Civil3D, Sketchup etc..)	
9.	Preparation of plan, section and elevation of a House with single bed room and attached bathroom with R.C.C. flat roof(Framed structure)	8
10.	Preparation of plan, section and elevation of a Single storied School building with R.C.C flat roof (Framed structure)	8
	TOTAL HOURS	**60**

Suggested List of Students Activity

- Task students with creating complex 3D models of civil engineering structures using advanced features in software
- Assign exercises where students model and analyze complex structures, considering material properties, boundary conditions, and loading scenarios.
- Explore advanced BIM concepts using software

Web-based/Online Resources:

- https://youtu.be/zR4fndvVEFU?si=bv7LZ1VW-NWH3hbw
- https://youtu.be/w5-Qx61s-eA?si=0cMNNyD9Cqrxshep
- https://youtu.be/qNm_6inyqQc?si=nm74Dg5Z5niJHz-J
- https://youtu.be/aa4tqsCbtjU?si=-dDFWP1FIBsSxC5K

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)

S.No.	List of the Equipments	Quantity Required
1	Computers	30 Nos.
2	Suitable Software for Electronic Spread Sheet	30 Users
3	Suitable Structural Analysis Software	30 Users
4	Suitable 3D drafting Software	30 Users

CEH578	Construction Management and Safety Practice	L	T	P	C
Practicum		1	0	4	3

Course Description:

This course combines essential aspects of construction management and safety practices to equip students with the skills needed for successful careers in the construction industry. Students learn project management fundamentals such as planning, scheduling, resource management, and budgeting, alongside estimation and costing techniques crucial for overseeing development projects. Microsoft Project is a powerful project management software that will be introduced to students as a tool for planning, scheduling, and managing construction projects effectively. In parallel, emphasis is placed on safety practices, covering occupational health and safety regulations, hazard identification, risk assessment, and emergency response protocols.

Course Objectives:

The objective of this course is to enable the student:

- Describe the importance of construction Management
- Carryout the Feasibility study of a project
- Understand contract documents and different types of contract.
- Prepare construction scheduling and resource management.
- Describe the aspects of inspection and quality control methods
- Describe the labour laws and legislation.
- Know about the safety practices followed in construction project.

Course Outcomes:

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

CO1 Understand the construction sector in India, roles of stakeholders, and stages of construction projects including feasibility studies and planning.

CO2 Explain contract management, types of contracts, tendering processes, and organizational procedures in construction projects.

CO3 Apply scheduling and time management techniques including CPM and PERT, and manage construction resources effectively.

CO4 Understand quality management, construction disputes, labor legislation, and ensure compliance with safety and labor laws.

CO5 Recognize the importance of safety in construction, identify causes of accidents, and apply ethical principles and engineering professionalism.

Pre-requisites: NIL

CO/PO & PSOs Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	1	-	-	2	-	-	-
CO3	-	2	-	-	-	-	1	3	2
CO4	-	-	-	3	1	-	-	-	-
CO5	-	-	-	-	-	-	1	3	1

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

Instructional Strategy:

- Employ strategies to capture students' interest and enhance their confidence in learning.
- Use real-life examples, case studies, and practical scenarios to illustrate concepts and principles, fostering relevance and applicability.

- Use real-life examples, case studies, and practical scenarios to illustrate concepts and principles, fostering relevance and applicability.
- Emphasize learning outcomes and employability skills throughout the course, ensuring that students acquire the knowledge and competencies essential for success in the construction industry.
- Create a supportive environment where students are encouraged to question, explore, and critically evaluate their findings, fostering a scientific mindset and problem-solving skills.
- Promote an environment where students feel comfortable exploring outcomes that may differ from their expectations.

CEH578	Construction Management and Safety Practice	L	T	P	C
Practicum		1	0	4	3

THEORY		PERIODS
UNIT-I	**1.1 CONSTRUCTION SECTOR IN INDIA** Construction Management – Definition- Need – Scope - Role of government and private construction agencies — Types of construction sectors - Construction practice:- the owner, consultant, and contractor - Duties and responsibilities – List of various stages of a construction project. **1.2 FEASIBILYTY STUDY AND PLANNING OF CIVIL ENGINEERING PROJECT** Feasibility– Technical feasibility, Financial feasibility, Ecological feasibility, Resource feasibility - Economical Analysis - Objectives of planning – Administrative approval –Technical sanction.	3
UNIT -II	**2.1 CONTRACT MANAGEMENT** Types of contracts - Contract documents - Tender notice – Types - Earnest Money Deposit (EMD) and Security Deposits (SD) - Scrutiny and acceptance of a tender - Contract agreement — Work order –Sub contract - Rights and duties of sub-contractor. **2.2 CONSTRUCTION ORGANISATIONS AND DEPARTMENTAL PROCEDURE** Forms of business organizations - Decentralization - Percentage completion report - Organization of P.W.D.- Accounting procedure (administrative sanctions, technical sanctions, payment of bills) – Imprest and Temporary accounts – Cash book - Works register — Importance of M-book and its entries – Nominal Muster Roll (N.M.R) – Daily Labour Reports (D.L.R)	3

UNIT -III	**3.1 SCHEDULING AND TIME MANAGEMENT** Definition – uses and advantages – Classification of Schedules – Methods of scheduling – Activity – Event – Dummies – Rules for developing networks – Fulkerson's rul99e for numbering the events - Critical Path Method Critical and Subcritical paths – Critical and Non critical activities/ events – Significance of critical path. **3.2 RESOURCE MANAGEMENT** Definition – Need for resource management –Optimum utilization of resources - Resource planning – Resource levelling and its objectives – Construction planning–Crashing – Need for crashing an activity – Methods and tips for crashing – Time VsCost optimization curve – Cost slope and its significance in crashing.	**3**
UNIT -IV	**4.1 QUALITY MANAGEMENT AND CONSTRUCTION DISPUTES** Importance of quality – Elements of quality – Quality assurance techniques (inspection, testing, sampling) – Construction Disputes - Introduction – Development of disputes – Categories of disputes – Modes of settlements - Arbitration. **4.2 CONSTRUCTION LABOUR AND LEGISTATION:** Need for legislation - Payment of wages Act - Factories Act – Contract labour (Regulation and abolition) Act – Employees Provident Fund (EPF) Act.	**3**
Unit -V	**5.1 SAFETY IN CONSTRUCTION:** Importance of safety –Causes of accidents – Role of various parties (designer / employer /worker) in safety management – Benefits – Approaches to improve safety in construction **5.2 ETHICS IN ENGINEERING**	**3**

	Human values - Definition of Ethics - Engineering ethics - Engineering as a profession - Qualities of professional - Professional institutions - Code of ethics - Major ethical issues - Ethical judgement - Engineering and management decision - Value based ethics.	
PRACTICAL EXERCISES		
1	Problems to find EST, EFT, LST, LFT using MS Project and Excel .	6
2	Preparation of Key Plan, Job Layout using BIM tool like Revit/Sketch up/AutoCAD.	6
3	Problems on PERT network – TE, TL and slack using MS Project and Excel.	6
4	Problems to find Standard deviation and Variance using MS Project and Excel.	6
5	Writing M- book using MS Excel	6
6	Prepare comparative statements in selecting tender using MS Excel.	6
7	Calculate man hours for construction activity and link with scheduling.	6
8	Site visit and prepare safety checklist for construction activity.	6
9	MS project – CPM	6
10	MS project – PERT Analysis	6
TOTAL		**75**

Suggested List of Students Activity:

1. **Site visits:** Organize visits to construction sites where students can observe safety practices.
2. **Guest lecturers:** Invite professionals from the construction industry, including project managers, safety officers, and engineers, to speak to the class. They can share their experiences, insights, and best practices in construction management and safety.

Text and Reference Books:

1. "Construction Management: Principles and Practices" by S. K. Sharma
2. "Construction Project Management" by K.K. Chitkara
3. "Construction Management and Project Planning" by S. S. Bhavikatti
4. "Construction Project Management: A Practical Approach" by S. P. Bindra
5. "Construction Management: Principles and Practice" by A.K. Duggal
6. "Construction Safety Management" by S. K. Choudhary and R. R. Sharma
7. "Construction Site Safety Handbook" by S. K. Chakraborty
8. "Handbook on Construction Safety Management Practices in India" by V. J. Mathew
9. "Construction Safety Management: Indian Context" by S. S. Gupta
10. "The Construction Safety Guide: A Guide to OSHA Compliance and Injury Prevention" by David L. Goetsch and Raymond L. McCormick

Web-based/Online Resources:

1. Significance and objectives of Construction management : https://www.youtube.com/watch?v=olvs23_VaT0&list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&index=2
2. Network Terminology : https://www.youtube.com/watch?v=K6VvMVTh4iU&list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&index=9

3. Common causes of accidents on construction sites : https://www.youtube.com/watch?v=Zdeetmkhpks&list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&index=21
4. Concept of Quality Control & Inspection: https://www.youtube.com/watch?v=nM_dS4tobQs&list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&index=22
5. Need for Legislation and Importance of Labour Laws and Principles: https://www.youtube.com/watch?v=WK8hSg_653I&list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&index=23
6. Construction site safety rules: https://www.youtube.com/watch?v=YLH-Ih8omjI
7. Professional Ethics: https://www.youtube.com/watch?v=5LiRgVVqsg0

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)

S.No	List of Equipments	Quantity Required
1	Computers	30 Nos.
2	Laser Printers	3 Nos
3	CAD Software	30 Users
4	Suitable software for Electronic Spread Sheet	30 Users
5	Suitable Project Management Software	30 Users

CEH579	Environmental Engineering	L	T	P	C
Practicum		1	0	4	3

Introduction:

Diploma holders in Civil Engineering are expected to supervise construction of water supply and waste water treatment works. They are also responsible for waste disposal activities. This subject aims at imparting skills for preparing water supply and waste water engineering drawings to develop competencies for reading the drawings, and their execution in their field.

In addition, Civil Engineering diploma holders must have the knowledge of different types of environmental aspects due to development activities so that they may help in maintaining the ecological balance and control pollution. They should also be aware of the environmental laws for effectively combating environmental pollution.

Course Objectives:

The objectives of the course is to enable the students to

- Know the procedure of estimating water requirements for a water supply scheme.
- Select suitable sources of water supply and pipe materials.
- Determine the quality of water, testing procedures and standards for drinking water.
- Understand the methods of purification of water.
- Understand the systems of distribution for a water supply scheme.
- Understand the basic facts of sanitary engineering, the methods of collection and conveyance of sewage.
- Understand the primary and secondary treatment of sewage and disposal.
- Know the methods of disposal of sludge and solid wastes.
- Identify the various types of pollution and their prevention.

- Create awareness about environmental impact assessment.
- Understand the Cutting, threading and joining of G.I. Pipes/cutting and pasting of PVC pipes using solvents.
- Make suction and delivery pipe connections to a centrifugal pump (making indents, drawing a neat sketch of the connection with details).

Course Outcomes:

CO1 Understand the sources, quantity, and quality parameters of water including physical, chemical, and bacteriological tests, and recognize waterborne diseases.

CO2 Explain the objectives and processes involved in water treatment including sedimentation, coagulation, and flocculation, and determine optimum coagulant doses.

CO3 Describe water distribution systems including gravity, pumping, and combined systems, and understand various pipe fittings and layouts.

CO4 Understand sanitary engineering concepts including sewer systems, materials, joints, ventilation, cleaning, and sanitary fittings.

CO5 Explain primary treatment of sewage including components of sewage treatment plants and their functions.

Pre-requisites:

Knowledge of basic Science

CO/PO & PSOs Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	2	-	-	-
CO3	-	3	-	-	-	-	1	3	2
CO4	-	-	-	3	2	-	-	-	-
CO5	-	-	-	-	-	-	1	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.
- 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.

CEH579	Environmental Engineering	L	T	P	C
Practicum		1	0	4	3

UNIT I	**QUANTITY AND QUALITY OF WATER**	
	Water Supply-Flow Chart of a Water Supply Scheme - Need for Protected Water Supply - Types of Demand-Per Capita Demand - Sources of Water– Surface Sources–Underground Water Sources - Intakes - Types of Intakes - Pipes for Conveyance of Water - Cast Iron, G.I., Cement Concrete, R.C.C., Hume and PVC Pipes - Pipe Joints - Laying and Testing of Pipe Lines. Impurities in Water - Testing of Water - Collection of Water Sample - Physical, Chemical, Bacteriological Tests - Standards of Drinking Water - Water Borne Diseases and their Causes.	**3**
	Practical exercises: 1. Estimation of pH, TDS and Hardness of water sample 2. Estimation of Sulphate content from the Collected water samples from sources. 3. Determine the dissolved oxygen in the given sample of water. 4. Determine the chloride content in the given sample of water by silver Nitrate titration method.	**4** **4** **4** **4**
UNIT II	**TREATMENT OF WATER**	
	Objective of water treatment - Flow Diagram of a Treatment Plant-functions of units - Sedimentation–Types of Sedimentation Tank–principal of Coagulation–flocculation-Usual Coagulants–feeding of coagulants - mixing devices - Jar test.	**3**
	Practical exercises: 5. Determine the optimum dose of coagulant in a given raw water sample by jar test. 6. Prepare a report along with photo copies of a field visit to water treatment plant. (Not for Exam)	**4** **12**
UNIT III	**DISTRIBUTION SYSTEM**	

	Distribution System - Gravity System, Pumping System, Combined System - Systems of Water Supply - Continuous and Intermittent Supply of Water- Layouts of Distribution-Dead End, Grid Iron, Radial and Circular Systems.	**3**
	Practical exercises: 7. Study of various pipe fitting used in water supply (with actual models displayed onboard). (Not for Exam)	**4**
UNIT IV	**SANITARY ENGINEERING**	
	Sanitation - Systems of Sanitation - Variation in Rate of Flow of Sewage - Estimation of storm water - Minimum Size of Sewer– Shapes of Sewer (names only) – Materials used for Sewer-Joints in Sewer Line-Ventilation of Sewers-Cleaning of Sewers. Sewer Appurtenances Manhole-Lamp Hole-Catch Basin-Street-Inlet-Grease and Oil Trap - Flushing Tanks Drainage Arrangements in Buildings - Sanitary Fittings - Sewage Pumps Necessity - Types of Sewage Pumps (names only).	**3**
	Practical exercises: 8. Study of various sanitary wares. (Not for Exam)	**4**
	9. Making a bathroom connection from an existing water supply main (making indents, drawing a neat sketch of the connection with details).	**4**
	10. Making suction and delivery pipe connections to a centrifugal pump (making indents, drawing a neat sketch of the connection with details).	**4**
UNIT V	**PRIMARY TREATMENT OF SEWAGE**	
	Introduction-Flow Diagram of Sewage Treatment plant –Screens – Grit Chamber – Skimming Tank – plain sedimentation tank-Primary clarifiers - Secondary clarifiers – coagulation of sewage.	**3**
	Practical exercises: 11. Prepare a report along with photo copies of a field visit to sewage treatment plant. (Not for Exam)	**12**
	TOTAL	**75**

Suggested List of Students Activities:

- 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.
- Design and build a physical model of a water treatment plant.
- Group discussion about the distribution network and various layouts of distribution.
- Identify the suitable appurtenances for the appropriate location in the water distribution network system.
- Demonstrate and discussion on the process of coagulation and flocculation.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course

Reference Books:

- S.K. Garg, "Water Supply and Sanitary Engineering", PHI Kanna publishers, New Delhi".
- S.C.Rangwala, Water Supply and Sanitary Engineering, Charotar Publishing House, New Delhi, 2007
- G.S. Birdie and J.S.Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai Publishers, New Delhi, 2010.
- N.N.BASAK, Environmental Engineering, Tata Mc Graw hill publishing Company Ltd., New Delhi, 2010
- A.KamalaD.l.kanthrao, Environmental Engineering, TataMcGraw hill publishing Company Ltd., New Delhi, 1985
- Gurcharan Singh, Water supply and Sanitary Engineering vol.I & II, Standard publishers & distributors, New Delhi, 2007.
- Dr.Suresh K.Dhameja, Environmental Engineering and Management, S.K.Kataria & Sons, New Delhi. 2005.
- B.C Punmia, Environmental Engineering, Laxmi Publications, New Delhi, 2010
- Dr.Suresh, K.Dhamija, Environmental Studies, S.K.Katarial Sons, Delhi, 2010

Web-based/Online Resources

Quantity And Quality Of Water	:	https://youtu.be/OCXnlInDVOU?si=JkxRiTuVPQI_FrGS
Treatment Of Water	:	https://youtu.be/0_ZcCqqpS2o?si=Jo1i64uS_SCSc8I3
Distribution System	:	https://youtu.be/Fqk0G1yDjeY?si=8Sy_XcxL8rMJ2JWJ
Sanitary Engineering	:	https://youtu.be/8FNJDjxtKjY?si=Gs0BdS1nf03Vh0NO
Primary Treatment Of Sewage	:	https://youtu.be/s8IVjQg7yno?si=ivQQGG5S_MQdX2JP

LIST OF EQUIPMENTS (for a batch of 30 students):

S. No	Name of the equipment	Numbers required
1.	Spectrophotometer	1No.
2.	Jar Test Apparatus	1No.
3.	Turbidity Meter	1No.
4.	Dissolved Oxygen Meter	1No.
5.	Drying Oven	1No.
6.	Analytical Balance	1No.
7.	Dessicator	1No.
8.	Dishtongs	1No.
9.	Evaporating Dish	1No.
10.	Filter Membrane	1No.
11.	Vacuum Pump	1No.
12.	Crucible	1No.
13.	Whatt Man Filter Paper	Required Nos.
14.	Wash Bottle	2 Nos.
15.	Pipette, Burette, Funnel, Conical Flask, Beaker, Bunsen Burner, Stand, Wire Gauge, Filter Paper	As Required
16.	Pipe Fitting used in Water Supply	As Required
17.	Sanitary Ware Specials	As Required
18.	Specials of Bathroom Connections	As Required

19.	pH Tester	1 No.
20.	TDS testing device	1 No.
21.	Necessary reagents and Chemicals	As Required
22.	Necessary Sample Preparation Utilities	As Required
23.	Centrifugal Pump (0.5 HP)	1 No.

CEH57A	Innovation and Start-ups	L	T	P	C
Practicum		1	0	2	2

Introduction

The integration of Innovation and Start-ups concept within the syllabus is testament to the forward-thinking nature of educational institutions. By introducing this concept, students are provided with a solid foundation upon which they can build their skills in Innovation and Start-ups. This course can bridge the gap between theory and practice. It allows students to apply the knowledge they have acquired in a real-world context, thereby enhancing their understanding and retention of the above concept. This experimental learning approach not only fosters a deeper level of engagement but also trains student with practical skills necessary to navigate the complexities of the business world. This also empowers students to become an Innovator or Entrepreneur. With necessary tools and knowledge, educational institutions are preparing the next generation of entrepreneurs to tackle the challenges and opportunities that lie ahead. This syllabus will explore the different facets of innovation, including its importance, types and strategies for fostering a culture of innovation within organizations

Course Objectives

The objective of this course is to enable the students

- To understand the concept of Innovation and Start-ups.
- To acquire knowledge of Prototype development, IPR, Patents and Copyrights.
- To have practical experience in preparing Business plan for Start-ups.
- To visit the existing nearby industry to prepare a project report about the present challenges of that industry.
- To know the different funding supports available from Government and Non-Government schemes for Start-ups.

Course Outcomes

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

CO1 Understand the fundamentals of innovation, creativity, and entrepreneurship, including types and challenges of innovation and design thinking.

CO2 Explain the processes of idea generation, prototype development, marketing of innovations, and intellectual property rights (IPR) including patents and copyrights.

CO3 Describe the start-up ecosystem in India, registration procedures, business models, funding opportunities from government and non-government schemes.

CO4 Develop communication and presentation skills through seminars on innovation management, product development, business models, and start-up strategies.

CO5 Gain practical exposure by studying industries, incubation centers, and start-ups, and prepare detailed project reports covering various operational aspects.

Pre-requisites:

There are no specific prerequisites for this course, although a basic understanding of business and technology concepts would be beneficial.

CO/PO & PSOs Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	2	-	-	-
CO3	-	3	-	-	-	-	1	3	2
CO4	-	-	-	3	2	-	-	-	-
CO5	-	-	-	-	-	-	1	3	1

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

CEH57A	Innovation and Start-ups	L	T	P	C
Practicum		1	0	2	2

Unit-I		**INTRODUCTION TO INNOVATION**	
	An Introduction to Innovation and Creativity- Innovation in current Environment - Types of Innovation - Challenges of Innovation - Steps of Innovation Management - Divergent v/s Convergent thinking - Design thinking and Entrepreneurship		6
Unit-II		**INCUBATION CLUBS, IPR, PATENTS AND COPYRIGHTS**	
	Idea Generation - Incubation Clubs - Prototype Development - Marketing of Innovation - Management of Innovation - Creation of IPR -Types of IPR - Patents and Copyrights - Patents in India - Technological and Non-Technological Innovation Process.		6
Unit-III		**GOVERNMENT AND NON-GOVERNMENT FUNDING SCHEMES FOR START-UPS**	
	An introduction to Start-up - Start-ups in India - Procedure for registration of Start- ups - Business Model- Business Plan - Case Studies - Opportunities and Challenges - Funding supports from Government Schemes -MUDRA, TANSEED, NEEDS, PMEGP, UYEGP – Non-Government Schemes - CSR Fund - Angel Investors - Venture Capitalist .		6
Unit-IV		**SEMINAR**	
	All the students have to select a minimum of 2 topics from the list given below. They are expected to collect the resources with the help of faculty assigned to them to prepare PPTs for presentation 1. Idea Generation 2. Innovation Management 3. Product Development		9

4. Business Model Innovation 5. Organizational Culture and Change Management 6. Leadership and Innovation 7. Barriers to Innovation 8. Innovation Marketing 9. E-Commerce success stories (any one) 10. Role of Start-ups in Higher Education 11. Professional Networking in Building Brands 12. How to start a start-up in India		
Unit- V	**EXPOSURE TO INDUSTRY**	18
All the students should visit and study the nearby industries, incubation centres, start-ups etc., and select any one to prepare a project report which covers the Name of the Industry/Organization, Introduction of the Industry, Type of the Industry, Scope of the Industry, Plant Layout and Location, Details of Plant and Machineries, Process flow chart, Manufacturing Methods, Process of Manufacturing, Product Manufacturing, Quality Control, Marketing, Product selling - Conclusion		
	TOTAL	**45**

Detailed Allocation of Marks - End Semester Examination - 60 marks

S.No	Description	Marks
Part A i)	Written Examination – Unit –I, II & III Theory Questions 10 questions out of 15 questions (10 x 3 marks:30 marks)	45
ii)	3 questions either or pattern (3 x 5 marks: 15 marks)	
Part B i)	Presentation of Industry Visit Project Report	25
ii)	Interaction and Evaluation	30
	TOTAL	**100**

VI SEMESTER

CEH681	Advanced Engineering Mathematics	L	T	P	C
Theory		3	0	0	3

Introduction:

Mathematics is essential for engineering students to understand core engineering subjects. It provides the framework for engineers to solve problems in engineering domains. This course is designed to bridge the gap between diploma mathematics and B.E/B.Tech mathematics in matrix algebra, differential calculus, vector calculus, differential equations, and Laplace transforms.

Course Objectives:

The objective of this course is to enable the students to

1. Understand the concepts of eigen-values and eigen-vectors of matrices.
2. Learn the notation of partial differentiation and determine the extremities of functions of two variables.
3. Acquire knowledge in vector calculus which is significantly used to solve engineering problems.
4. Formulate and solve differential equations.
5. Understand Laplace transformation and its engineering applications.

Course Outcomes:

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

CO1 Compute eigenvalues and eigenvectors of matrices, apply Cayley-Hamilton theorem, and understand their properties for engineering applications.

CO2 Analyze functions of several variables, compute partial derivatives, Jacobians, and solve maxima and minima problems.

CO3 Understand vector calculus concepts including gradient, divergence, curl, and their applications in scalar and vector fields.

CO4 Formulate and solve ordinary differential equations of first and second order using standard methods and interpret solutions.

CO5 Apply Laplace transform techniques to solve differential equations and analyze engineering problems.

Pre-requisites:

Matrices, Determinants, Differentiation, Integration and Vector Algebra.

CO/PO Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	2	1	0	1	3	2
CO2	3	3	2	2	1	0	1	3	2
CO3	3	3	2	2	1	0	1	3	2
CO4	3	3	2	2	1	0	1	3	2
CO5	3	3	2	3	1	0	1	3	3

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

Instructional Strategy:

- A theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based.
- All demonstrations/Hands-on practices might be under a simulated environment.
- Use inducto-deductive approach to achieve the desired learning objectives.
- Use open-ended questions to nurture the problem-solving and reasoning skills among students.
- Support and guide the students for self-study.
- State the need for mathematics with engineering studies and provide real-life examples.

CEH681	Advanced Engineering Mathematics	L	T	P	C
Theory		3	0	0	3

Unit I	**EIGENVALUES AND EIGENVECTORS**	
	Characteristic equation – Eigen-values of 2×2 and 3×3 real matrices – Eigen-vectors of 2×2 real matrices – Properties of eigen-values (excluding proof) – Cayley-Hamilton theorem (excluding proof) – Simple problems.	**7**
Unit II	**FUNCTIONS OF SEVERAL VARIABLES**	
	Partial derivatives of two variable and three variable functions (up to second order) – Homogeneous functions and Euler's theorem (excluding proof) – Jacobian matrix and determinant – Maxima and minima of functions of two variables – Simple problems.	**7**
Unit III	**VECTOR CALCULUS**	
	Scalar filed and Vector field – Vector differential operator – Gradient of a scalar field – Directional derivative – Divergence and curl of a vector field (excluding properties) – Solenoidal and irrotational vector fields – Simple problems.	**7**
Unit IV	**DIFFERENTIAL EQUATIONS**	
	Differential equation – Formation – Order and degree – Solution of a differential equation – Equations of first order and first degree – Variable separable method – Leibnitz's Linear equations – Second order equations of the form $(aD^2 + bD + c)y = e^{nx}$ where a, b, c and n are constants and the auxiliary equation $am^2 + bm + c = 0$ has only real roots) – Complementary function – Particular integral – General solution – Simple problems.	**7**
Unit V	**LAPLACE TRANSFORMS**	
	Definition of Laplace transform – Laplace transforms of standard functions - Linearity and change of scale property (excluding proofs) – First shifting property – Laplace transforms of derivatives – Properties (excluding proofs) – Inverse Laplace transforms – Properties (excluding proofs) – Solving first order ordinary differential equation using Laplace transforms – Simple problems.	**7**

	Revision + Test	**10**
	TOTAL	**45**

Suggested List of Students Activities:

- Demonstrate the applications of eigen-values in stability analysis, decouple of three-phase systems and vibration analysis.
- Demonstrate maxima and minima of two variable functions using GeoGebra graphing calculator.
- Demonstrate solenoidal vector field and irrotational vector field using engineering applications.
- Demonstrate the applications of differential equations in solving engineering problems.
- Presentation /Seminars by students.
- Quizzes.

Reference Books:

1. John Bird, Higher Engineering Mathematics, Routledge, 9th Edition, 2021.
2. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
3. Arumugam, S., Thangapandi Isaac, A., & Somasundaram, A., Differential Equations and Applications, Yes Dee Publishing Pvt. Ltd., 2020.
4. Duraipandian, P., & Kayalal Pachaiyappa, Vector Analysis, S Chand and Company Limited, 2014.
5. Narayanan, S., & Manicavachagom Pillai T.K., Calculus Volume I and II, S.Viswanathan Publishers Pvt. Ltd., 2007.

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/

CEH682	Entrepreneurship	L	T	P	C
Theory		3	0	0	3

Introduction

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspiration of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic environments; to ensure equity of opportunity and participation and finally promoting concern for excellence. In this context the course on entrepreneurship and start-ups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs, relevant to social prosperity and thereby ensure good means of living for every individual, provides jobs and develop Indian economy.

Course Objectives

After completing this subject, the student will be able to

- Acquire entrepreneurial spirit and resourcefulness
- Familiarize Acquire knowledge about the business idea and product selection
- Analyze the banking and financial institutions
- Understand the pricing policy and cost analysis
- Get knowledge about the business plan preparation

Course Outcomes

CO1 Understand the concept, importance, and process of entrepreneurship, including competencies, ethical values, creativity, and innovation.

CO2 Analyze different types of business models, resource management, intellectual property rights, and evaluate business opportunities using SWOT analysis.

CO3 Describe the classification of business enterprises, role of financial institutions, government policies, and entrepreneurial support systems.

CO4 Apply pricing and cost analysis techniques including cost classification, break-even analysis, cash flow projections, and GST implications.

CO5 Develop a comprehensive business plan incorporating feasibility study, market research, marketing strategies, and digital branding.

Pre-requisites

Knowledge of basics of Engineering and Industrial engineering

CO/PO & PSO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	1	2	-	-	-
CO3	-	3	1	1	-	-1	1	-	2
CO4	-	1	-	3	2	-	-	-	-
CO5	-	-	-	-	-	-	1	3	1

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 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.

CEH682	Entrepreneurship	L	T	P	C
Theory		3	0	0	3

Unit I	ENTREPRENEURSHIP – INTRODUCTION AND PROCESS	
Concept of entrepreneurship - Importance, Myths about Entrepreneurship, Pros and Cons of Entrepreneurship, Process of Entrepreneurship, , Competencies and characteristics of an entrepreneur -, Ethical Entrepreneurship, Entrepreneurial Values and Attitudes, Creativity, Innovation and entrepreneurship- Entrepreneurs - as problem solvers, Mindset of an employee and an entrepreneur, - Risk Taking-Concepts		7
UNIT II	**BUSINESS IDEA**	
Types of Business: Manufacturing, Trading and Services, Stakeholders: sellers, vendors and consumers and Competitors, E- commerce Business Models, business idea generation -Types of Resources - Human, Capital and Entrepreneurial tools and resources, etc., - setting business goals- Patent, copyright and Intellectual property rights, Customer Relations and Vendor Management, -Business Ideas vs. Business Opportunities, Opportunity – SWOT ANALYSIS of a business idea - Business Failure – causes and remedies. - Types of business risks,		7
UNIT III	**BANKING**	
Size and capital- based classification of business enterprises- Role of financial institutions, Role of Government policy, Entrepreneurial support systems, Incentive schemes for state government, and Incentive schemes for Central governments.		7
UNIT IV	**PRICING AND COST ANALYSIS**	
Types of Costs - Variable - Fixed- Operational Costs - Break Even Analysis - for single product or service, -financial Business Case Study, Understand the meaning and concept of the term Cash Inflow and Cash Outflow- Pricing- Calculate Per Unit Cost of a single product, , Understand the importance and preparation of Income Statement, Prepare a Cash Flow Projection- Factors affecting pricing. - GST.		7
UNIT V	**BUSINESS PLAN PREPARATION**	
Feasibility Report – Technical analysis, financial analysis- Market Research - Concept, Importance and Process- tools for market research- Market Sensing and Testing,		7

Marketing and Sales strategy, Digital marketing, Branding - Business name, logo, tag line, Promotion strategy, Business Plan Preparation, -Concept and Importance, , Execution of Business Plan.	
Revision + Test	**10**
TOTAL HOURS	**45**

Suggested list of Students Activity.

1. Students can explore app development or web design. They'll learn about technology, user experience, and marketing.
2. Hosting events, workshops, or conferences allows students to practice project management, networking, and marketing skills.
3. Encourage students to address social or environmental issues through innovative business solutions. This fosters empathy and creativity.
4. Part of entrepreneurship clubs or organizations provides networking opportunities, mentorship, and exposure to real-world challenges.
5. Competitions like business plan contests or pitch events allow students to showcase their ideas and receive feedback.
6. Students can create and sell handmade crafts, artwork, or other products. This teaches them about production, pricing, and customer relations.
7. Students can provide consulting services in areas they're knowledgeable about, such as social media marketing or financial planning.
8. Encourage students to create and manage their own small business or offer freelance services. This hands-on experience helps them understand various aspects of entrepreneurship.

Reference Books:

1. Dr. G.K. Varshney, Fundamentals of Entrepreneurship, Sahitya Bhawan Publications, Agra.
2. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Entrepreneurship, McGraw Hill (India) Private Limited, Noida .
3. Development and Small Business Enterprises, Pearson Education, Noida - 201301
4. Trott, Innovation Management and New Product Development, Pearson Education, Noida - 201301

5. M N Arora, A Textbook of Cost and Management Accounting, Vikas Publishing House Pvt. Ltd., New Delhi-110044
6. Prasanna Chandra, Financial Management, Tata McGraw Hill Education Private Limited, New Delhi
7. I. V. Trivedi, Renu Jatana, Indian Banking System, RBSA Publishers, Rajasthan
8. Simon Daniel, How to Start a Business In India, Buuks, Chennai - 600018
9. Ramani Sarada, The Business Plan Write-Up Simplified - A practitioners guide to writing the Business Plan, Notion Press Media Pvt. Ltd., Chennai 600095.

Web Reference

- https://youtu.be/MdNNGfoxrqA
- NPTEL Courses
- MSME (tn.gov.in)
- ..:: Welcome To ::.. - Centre for Entrepreneurship Development (Tamilnadu) (cedtn.org)
- EDII's Hackathon (tn.gov.in)

CEH683	Project Management	L	T	P	C
Theory		3	0	0	3

Introduction

Project management is the systematic application of knowledge, skills, tools, and techniques to project activities to meet specific project requirements. It involves planning, organizing, and managing resources to achieve project goals within defined scope, time, and budget constraints. Project management encompasses several key processes and phases, including initiation, planning, execution, monitoring and controlling, and closing. It is essential across various industries to ensure projects are completed successfully, efficiently, and effectively, aligning with organizational objectives and stakeholder expectations. Project managers play a crucial role in leading teams, managing risks, ensuring quality, and communicating with stakeholders to drive project success.

Course Objectives

After completing this subject, the student will be able,

- To understand the concept, characteristics and elements of projects.
- To understand the stages in Project Life Cycle.
- To appreciate the need for Project Portfolio Management System.
- To know the considerations in choosing appropriate project management structure.
- To understand the components of techno-economic feasibility studies.
- To know about the detailed project report
- To learn about project constraints.
- To understand the techniques of evaluation.
- To get insight into the Social Cost Benefit Analysis Method.
- To know how to construct project networks using PERT and CPM.
- To learn how to crash project networks
- To understand the meaning of project appraisal.
- To understand the meaning of project audits.
- To know the qualities of an effective project manager.
- To understand the stages in Team Development model.

Course Outcomes

CO1 Understand the fundamentals of project management, classification, portfolio management systems, project definition, and causes of project delays.

CO2 Analyze various stages and components of project feasibility studies, phases of a project, project life cycle, and constraints affecting projects.

CO3 Evaluate projects under certainty and uncertainty using financial techniques such as Net Present Value, Benefit-Cost Ratio, Internal Rate of Return, and Social Cost Benefit Analysis.

CO4 Develop project networks using PERT and CPM, perform project appraisal and control, including crashing, resource leveling, and audits.

CO5 Differentiate between managing and leading projects, understand qualities of project managers, team building models, and manage project teams effectively.

Pre-requisites

Basic Knowledge.

CO/PO & PSOs Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	1	-	2	-	-	-
CO3	-	3	-	-	-	-	-	1	-
CO4	-	-	1	3	2	-	-	-	1
CO5	-	1	-	-	-	-	1	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 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.
- All demonstrations/Hand-on practices may be followed in the real environment as far as possible.

CEH683	Project Management	L	T	P	C
Theory		3	0	0	3

UNIT I	**PROJECT MANAGEMENT – AN OVERVIEW, PROJECT PORTFOLIO MANAGEMENT SYSTEM AND STRUCTURE, STEPS IN DEFINING PROJECT AND PROJECT DELAYS**	
Project – Classification – Importance of Project Management – An Integrated Approach – Project Portfolio Management System – The Need – Choosing the appropriate Project Management Structure: Organizational considerations and project considerations – steps in defining the project – project Rollup – Process breakdown structure – Responsibility Matrices – External causes of delay and internal constraints.		7
UNIT II	**VARIOUS STAGES AND COMPONENTS OF PROJECT FEASIBILITY STUDIES, PHASES OF A PROJECT, STAGES IN PROJECT LIFE CYCLE AND PROJECT CONSTRAINTS**	
Project feasibility studies - Opportunity studies, General opportunity studies, specific opportunity studies, pre-feasibility studies, functional studies or support studies, feasibility study – components of project feasibility studies – Managing Project resources flow – project planning to project completion: Pre-investment phase, Investment Phase and operational phase – Project Life Cycle – Project constraints.		7
UNIT III	**PROJECT EVALUATION UNDER CERTAINTY AND UNCERTAINTY, PROJECT EVALUATION, COMMERCIAL AND SOCIAL COST BENEFIT ANALYSIS**	
Project Evaluation under certainty - Net Present Value (Problems - Case Study), Benefit Cost Ratio, Internal Rate of Return, Urgency, Payback Period, ARR – Project Evaluation under uncertainty – Methodology for project evaluation – Commercial vs. National Profitability – Social Cost Benefit Analysis, Commercial or National Profitability, social or national profitability.		7
UNIT IV	**DEVELOPING PROJECT NETWORK USING PERT AND CPM, PROJECT APPRAISAL AND CONTROL PROCESS.**	

Developing a Project Plan - Developing the Project Network – Constructing a Project Network (Problems) – PERT – CPM – Crashing of Project Network (Problems - Case Study) – Resource Leveling and Resource Allocation – how to avoid cost and time overruns – Steps in Project Appraisal Process – Project Control Process – Control Issues – Project Audits – the Project Audit Process – project closure – team, team member and project manager evaluations.		7
UNIT V	**PROJECT MANAGING VERSUS LEADING OF PROJECT, QUALITIES OF PROJECT MANAGER AND MANAGING PROJECT TEAMS, TEAM BUILDING MODELS AND PERFORMANCE TEAMS AND TEAM PITFALLS.**	
Managing versus leading a project - managing project stakeholders – social network building (Including management by wandering around) – qualities of an effective project manager – managing project teams – Five Stage Team Development Model – Situational factors affecting team development – project team pitfalls.		7
	Revision + Test	**10**
	TOTAL HOURS	**45**

Suggested list of Students Activity,

Project Simulation and Role-Playing:

- Activity: Participate in simulated project scenarios where students take on different roles within a project team (e.g., project manager, team member, stakeholder).
- Purpose: This helps students understand the dynamics of project management, including leadership, communication, and team collaboration.

Case Study Analysis:

- Activity: Analyze real-world case studies of successful and failed projects.
- Purpose: This activity enables students to apply theoretical knowledge to practical situations, identify best practices, and learn from the challenges and solutions implemented in real projects.

Project Plan Development:

- Activity: Develop a comprehensive project plan for a hypothetical or real project, including scope, schedule, budget, risk management, and quality management plans.
- Purpose: This allows students to practice creating detailed and structured project plans, honing their skills in planning and organizing project activities.

Group Project:

- Activity: Work in teams to manage a project from initiation to closure, simulating a real project environment.
- Purpose: Group projects help students learn how to work collaboratively, manage group dynamics, and apply project management tools and techniques in a team setting.

Project Management Software Training:

- Activity: Gain hands-on experience with project management software such as Microsoft Project, Asana, or Trello.
- Purpose: This activity equips students with practical skills in using technology to plan, track, and manage project tasks and resources efficiently.

Reference Books:

1. Arun Kanda, Project Management, Phi, Delhi, 2011
2. Panneerselvam & Senthilkumar, Project Management, Phi, Delhi, 2009
3. Ramakrishna, Essentials Of Project Management, Phi, Delhi, 2010
4. Clifford F. Gray And Erik W. Larson, Project Management – The Managerial Process, Tata Mcgraw Hill.
5. Dragan Z. Milosevic, Project Management Toolbox: Tools And Techniques For The Practicing Project Manager,
6. Gopalakrishnan, P/ Ramamoorthy, V E, Textbook Of Project Management, Macmillan India. Ltd.
7. Harold Kerzner, Project Management: A Systems Approach To Planning, Scheduling, And Controlling, Eighth Edition, John Wiley & Sons
8. Jason Charvat, Project Management Methodologies: Selecting, Implementing, And Supporting Methodologies And Processes For Projects, John Wiley & Sons
9. Jason Westland, The Project Management Life Cycle.
10. Kevin Forsberg, Ph.D, Hal Mooz, Visualizing Project Management: A Model For Business And Technical Success, Second Edition, Pmp And Howard Cotterman, John Wiley & Sons.
11. Maheswari, S.N., Principles Accounting, Sultan Chand & Sons. Of Management
12. Robert K. Wysocki And Rudd Mcgary, Effective Project Management, Third Edition, John Wiley & Sons.

Web Reference

https://youtu.be/pc9nvBsXsuM

NPTEL Courses

https://youtu.be/PqQqTAu_FiM

CEH684	Remote Sensing and Geoinformatics	L	T	P	C
Theory		3	0	0	3

Introduction

Remote Sensing and Geoinformatics is an essential discipline for modern civil engineering, combining satellite- and aerial-based sensing techniques with geographic information systems (GIS) to capture, process, analyze, and visualize spatial data. By leveraging remote sensing data (e.g., multispectral, hyperspectral, LiDAR, SAR) and geospatial tools, civil engineers can perform accurate site surveys, monitor infrastructure health, model terrain and hydrology, plan transportation networks, and manage resources more effectively. This course equips diploma-level civil engineering students with the theoretical foundations and practical skills needed to integrate remote sensing and GIS into planning, design, construction, and maintenance processes.

Course Objectives

By the end of this course, students will be able to:

1. Understand fundamental principles of remote sensing, including electromagnetic spectrum interactions, sensor types, and platforms (satellites, UAVs).
2. Acquire and preprocess remote sensing imagery (radiometric and geometric corrections, image enhancement).
3. Apply GIS concepts for spatial data management, including data models, projections, and database organization.
4. Perform spatial analyses relevant to civil engineering (terrain modeling, surface drainage analysis, land-use classification).
5. Integrate remote sensing data with GIS for infrastructure planning, monitoring, and decision support.
6. Evaluate accuracy and limitations of remote sensing and GIS outputs in real-world civil engineering scenarios.
7. Develop basic geospatial workflows using industry-standard software (e.g., QGIS, ArcGIS, ERDAS Imagine).

Course Outcomes

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

CO1 Analyze electromagnetic radiation interactions, spectral signature concepts, and atmospheric effects to select appropriate remote sensing sensors and platforms for civil engineering tasks.

CO2 Evaluate the geometric accuracy of vertical aerial photographs, plan optimal flight missions, and operate stereoscopic plotting instruments for ortho-photo production.

CO3 Apply advanced digital image processing and interpretation techniques—including image rectification, restoration, enhancement, and classification—to extract actionable information for civil engineering projects.

CO4 Analyze and critique GIS data structures, coordinate systems, projection methods, and DBMS design to ensure spatial data integrity and suitability for civil engineering analyses.

CO5 Create and implement integrated remote sensing & GIS workflows—covering data entry, storage, overlay operations, and quality control—for applications in regional planning, hydrology, transportation network design, and site investigations.

Pre-requisites

Knowledge of basic mathematics

CO/PO & PSO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	2	-	-	-
CO3	-	3	-	-	-	-	1	3	2
CO4	-	-	-	3	2	-	-	-	-
CO5	-	-	-	-	-	-	1	3	1

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

Instructional Strategy

Here are five key instructional strategies for delivering the Remote Sensing & Geoinformatics course effectively:

Blended Lectures and Demonstrations

Combine concise theoretical lectures with live demonstrations of software tools (e.g., QGIS, ERDAS Imagine) to illustrate concepts such as spectral signatures, image enhancement, and GIS data structures in real time.

Hands-On Lab Sessions

Schedule weekly computer-lab exercises where students preprocess imagery, run classification algorithms, digitize maps, and perform overlay analyses. Provide step-by-step worksheets and sample datasets to reinforce learning by doing.

Field-Based Data Acquisition

Organize short field trips (on-campus or nearby sites) for students to collect ground-truth observations, practice flight planning concepts, and capture UAV imagery. Follow up in the lab by correlating field data with satellite/UAV imagery.

Case-Study and Project Work

Assign small group projects focused on real civil-engineering scenarios (e.g., flood-risk mapping, highway alignment, site suitability). Students will apply end-to-end workflows—data acquisition, processing, analysis, and map production—and present their findings.

Peer Instruction and Critique

Incorporate structured peer-review sessions in which student pairs exchange their maps and workflows, critique data quality, discuss parameter choices, and suggest improvements. This encourages critical thinking and deepens understanding of accuracy and limitations.

Reference Books:

1. Lo & Yeung (2005), Geographic Information Systems, Prentice of India.

2. Anji Reddy.M. (1998), Remote Sensing and Geographical information systems.

3. Lillesand, T.M. & Kiefer R.W. (1998), Remote Sensing and image interpretation, John Wiley & Sons, Newyork.

4. Burrough P.A. (2000), Principle of Geographical Information Systems for land resources assessment, Clarendon Press, Oxford.

5. Clarke Parks & Crane (2005), Geographic Information Systems & Environmental Modelling, Prentice-Hall of India.

6. Wolf Paul (1998), Elements of Photogrammetry, McGraw Hill, New Delhi.

CEH684	Remote Sensing and Geoinformatics	L	T	P	C
Theory		3	0	0	3

UNIT I	FUNDAMENTALS OF REMOTE SENSING	
Basics of Remote Sensing: Definitions and its components – Energy Sources and Radiation principles – electromagnetic radiation (EMR) – spectrum – wavelength regions important to remote sensing – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil. Characteristic of real remote sensing system, platforms, orbit types, sensors, resolution concept satellite, -Pay load description of important Indian Earth Resources and Meteorological satellites.		7
UNIT II	**PHOTOGRAMMETRY**	
Geometric elements of a vertical photograph – Stereoscopic plotting instruments, ortho photos, Flight planning.		7
UNIT III	**IMAGE INTERPRETATION AND ANALYSIS**	
Fundamentals of Air-photo interpretation - Elements of image- interpretation, concepts of digital image processing image Rectification and Restoration, Image enhancement, Image classification, Application of Remote sensing in Civil Engineering.		7
UNIT IV	**FUNDAMENTALS OF GIS**	
Basic Concepts of GIS – Basic spatial concepts –Coordinate Systems: Definitions - History of development of GIS - Components of GIS: Hardware, Software, Data, People and Methods – Proprietary and open-source Software - Types of data – Spatial, Attribute data- types of attributes – scales/ levels of measurements -Data Base Management Systems (DBMS)		7
UNIT V	**GIS - DATA ENTRY, STORAGE AND ANALYSIS**	

Data models - Vector and raster data – data compression – data input by digitization and scanning, data storage – attribute data analysis – integrated data analysis- mapping concept - development of map overlay, overlay operation - Errors and quality control. Land Information System (LIS)– Various GIS applications in Civil Engineering-	7
Regional Planning and Site investigations, Hydrology and Water Resources Engineering, Transportation network analysis - 80 Highway Alignments.	
Revision + Test	**10**
TOTAL HOURS	**45**

CEH685	Advanced Environmental Engineering	L	T	P	C
Theory		3	0	0	3

Introduction:

Diploma holders in Civil Engineering are expected to be responsible for Water Quality Assessment, Pollution and Polluting Agents, Treatment of Sludge, Waste Management etc..

Apart from basics of Environmental Engineering, some of the advanced topics dealing with the Environmental Engineering are discussed in this subject.

Course Objectives:

The objectives of the course is to enable the students to

- Know the procedure of process of filtration and disinfection of water in water supply scheme.
- Select suitable method of treatment of water from various sources.
- Know the pipe appurtenances required for water supply scheme.
- Understand the purpose of water management.
- Understand the various secondary treatment of sewage.
- Know the methods of disposal of sludge and solid wastes.
- Identify the various types of pollution and their prevention.

Course Outcomes:

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

CO1 Understand the principles and types of water filtration, disinfection methods, and water softening techniques for potable water treatment.

CO2 Conduct water waste surveys, understand pipe appurtenances, and apply water management practices to reduce wastage and improve distribution efficiency.

CO3 Comprehend secondary sewage treatment processes, miscellaneous treatment methods, and sludge disposal techniques.

CO4 Analyze environmental pollution types (water, soil, air, noise), their sources, effects, and control measures; understand solid waste management methods.

CO5 Understand the methodology of Environmental Impact Assessment (EIA) and assess environmental poisoning by heavy metals and trace elements.

Pre - requisites:

Knowledge of Basic Environmental Engineering.

CO/PO Mapping

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

CEH685	Advanced Environmental Engineering	L	T	P	C
Theory		3	0	0	3

UNIT I	**FILTRATION, DISINFECTION AND SOFTENING OF WATER**	
	1.1 FILTRATION OF WATER Theory of filtration - filter sand - Types - Slow Sand Filter - Rapid Sand Filter - comparison of slow sand and rapid sand filter - Pressure Filter.	**3**
	1.2 DISINFECTION OF WATER Necessity of Disinfection - Types of disinfection - Minor methods of Disinfection - Chlorination - Action of chlorine - Application of chlorine - Forms of Chlorination.	**3**
	1.3 WATER SOFTENING Water Softening - Necessity of Water Softening - Hardness - Types of Hardness - Effects of Hardness - Removal of Hardness (names only) - Miscellaneous Water treatment (names only) - Mineral water - Requirements - Treatment Process - Reverse of Osmosis (RO).	**3**
UNIT II	**WATER WASTE SURVEYS, PIPE APPURTENANCES AND WATER MANAGEMENT**	
	2.1 WATER WASTE SURVEYS Wastage of water - Water waste surveys - Permissible wastage of water - Preventive measures - Water waste test - Maintenance of distribution system.	**3**
	2.2 PIPE APPURTENANCES Necessity - Air values - Bib cocks - Fire hydrants - Reflux valves - Scour valves - Sluice valves - Stop cocks - water meters	**3**

	2.3 WATER MANAGEMENT Introduction of water management - Measures for reshaping local water balance - Uses and resources.	**3**
UNIT III	**SECONDARY TREATMENT, MISCELLANEOUS METHODS AND SLUDGE DISPOSAL**	
	3.1 SECONDARY TREATMENT OF SEWAGE Filters - Types - Contact beds - Intermittent sand filters - Trickling Filters - Activated Sludge Process (ASP) - Advantages and Disadvantage of ASP - Comparison of ASP versus Trickling filters. **3.2 MISCELLANEOUS METHODS OF SEWAGE TREATMENT** General - Cesspool - Chlorination of sewage - Imhoff tanks - Oxidation ponds - Septic tanks - Soak pit - Dispersion Trenches - Waste from fertilizer factories. **3.3 SLUDGE DISPOSAL** Methods of sludge disposal - Disposal on land - Distribution by pipe line - Drying on drying beds - Dumping into the sea - Heat - drying - Incineration - Lagooning or Ponding - Digestion followed by drying - Sludge digestion tanks	**3** **3** **3**
UNIT IV	**ENVIRONMENTAL POLLUTION AND SOLID WASTE MANAGEMENT**	
	4.1 ENVIRONMENTAL POLLUTION Environment - Definition - Water pollution - Sources of water pollution - Effects of water pollution - Control of water pollution - soil pollution - Sources of soil pollution - Effects of soil pollution - Control of soil pollution - Noise pollution - Sources of noise pollution - Effects of noise pollution - Control of noise pollution - Air pollution - Sources of air pollution - Effects of air pollution on human beings, plants, animals, materials - air pollution control equipment - Control devices for particulate contaminants - Environmental degradation - Ozone layer depletion. **4.2 SOLID WASTE MANAGEMENT** Solid Waste Disposal - Necessity - Method of Solid Waste Disposal - dumping, sanitary landfill, composting - Energy from waste.	**6** **3**
UNIT V	**ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL POISONING**	

	5.1 ENVIRONMENTAL IMPACT ASSESSMENT Environmental impact assessment (EIA) - Methodology of EIA - Organizing the job - Performing the assessment - Preparation of Environmental Impact Statement (EIS) - review of EIS - Environmental risk assessment - limitation of EIA. **5.2 ENVIRONMENTAL POISONING** Cadium poisoning - Sources and Effects - Mercury poisoning - Sources and Effects - Trace metal poisoning - Definition - cation of metals - Sources and Effects.	**6** **3**
	TOTAL	**75**

Suggested List of Students Activities:

- Prepare Models of rapid sand filtration process
- Compare various disinfection methods and identify the suitable disinfection method for the water from various sources.
- Identify the suitable appurtenances for the appropriate location in the water distribution network system.
- Demonstrate the process of Trickling Filters and Activated Sludge Process (ASP).
- Collect the details about the air pollution/noise pollution in the various industries and prepare the report.
- Visit any one solid waste disposal site and prepare the activities involved in the disposal .
- Case study about Environmental Impact Assessment for any one of the project .

Reference Books

- S.K. Garg,"Water Supply and Sanitary Engineering", PHI Kanna publishers, New Delhi".
- S.C.Rangwala,WaterSupplyandSanitaryEngineering, CharotarPublishingHouse, New Delhi, 2007
- G.S. Birdie and J.S.Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai Publishers, New Delhi, 2010.
- N.N.BASAK, Environmental Engineering, Tata Mc Grawhill publishing Company Ltd., New Delhi, 2010
- A. KamalaD.l.kanthrao, EnvironmentalEngineering,TataMcGrawhillpublishing Company Ltd., New Delhi, 1985
- Gurcharan Singh, Water supply and Sanitary Engineering vol.I & II, Standard publishers & distributors,

New Delhi, 2007.

- Dr.Suresh K.Dhameja, Environmental Engineering and Management, S.K.Kataria & Sons, New Delhi. 2005.
- BCPunmia,EnvironmentalEngineering,LaxmiPublications, NewDelhi,2010.
- Dr. Suresh,K. Dhamija,EnvironmentalStudies, S.K. KatarialSons, Delhi,2010.

Web - based/Online Resources		
Filtration Of Water	:	https://youtu.be/WuIEfG_9a_A?si=diaaSAEz89gXqciS
Disinfection Of Water	:	https://youtu.be/4CcRj_nJBGo?si=vRrwuZRJAtZPqbL_
Water Softening	:	https://youtu.be/iXVXhKUD9YY?si=J_FCSe3Moe6B_-_iWl
Water Waste Surveys	:	https://youtu.be/zL8FfxOFsVk?si=_-_1n3UQTd14uWJkJj
Pipe Appurtenances	:	https://youtu.be/fxu1Ouy1i_w?si=suSRFwXKSLbGk0Jx
Water Management.	:	https://youtu.be/pusN39_-_2loc?si=LIlS8nKHG0quaSvg
Secondary Treatment Of Sewage	:	https://youtu.be/s8lVjQg7yno?si=_-_8rRFdClHx4fnnDq
Miscellaneous Methods Of Sewage Treatment	:	https://youtu.be/FvPakzqM3h8?si=vckf3sV_-_fwg_TyPx
Sludge Disposal	:	https://youtu.be/RcP89d0_ZuI?si=OwvJsMEyOnv7kges
Environmental Pollution	:	https://youtu.be/e6rglsLy1Ys?si=MUQLTER2j2HZF4MK
Solid Waste Management	:	https://youtu.be/cjIacnNRLHE?si=1gCFIWTAIMjGNV_0
Environmental Impact Assessment	:	https://youtu.be/Uxh3MxOvDIs?si=AguDOUt4ALUwNUgd
Environmental Poisoning	:	https://youtu.be/MJcO0THfM8M?si=dhc0gNtNcmWTQ_-_yC

CEH686	Advanced Concrete Technology	L	T	P	C
Theory		3	0	0	3

Introduction:

Concrete is the material choice where strength, durability, impermeability, fire resistance and abrasion resistance are necessary. A deep understanding of concrete technology requires fundamental concepts, material characteristics and related laboratory experiments on concrete and its ingredients. It incorporates the latest Indian standard specifications and codes regulating concrete construction. The properties of concrete and it constituent materials and the role of various admixtures are the factors in modifying these properties to suit specific requirements.

The behaviour of concrete with respect to long-term drying shrinkage, plastic shrinkage, special concrete like FRC Polymer concrete is some of the areas in order to have better understanding of the complex behaviour of concrete. In addition to this, it explores the methods to repair and rehabilitation of structures already constructed

Course Objectives:

- Understanding the theoretical concept of Concrete material which includes Cement and admixtures.
- Build durability to resist cracks, weathering and chemical attack.
- Comprehend the properties of Fresh Concrete in special Environments
- Know various types of special concretes & its application.
- Understand repair materials and their applications

Course Outcomes:

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

CO1 Understand the chemistry of cement, including chemical composition, hydration process, and microstructure development in cement paste.

CO2 Explain the classification, functions, and effects of chemical and mineral admixtures on fresh and hardened concrete properties.

CO3 Analyze factors affecting durability, permeability, and corrosion in concrete, including types and causes of cracking and preventive measures.

CO4 Understand concrete construction techniques in special environments such as underwater, cold weather, and hot weather concreting, including precautions.

CO5 Describe special concretes including lightweight concrete, fiber-reinforced concrete, polymer concrete, and self-compacting concrete, along with their properties and applications.

Pre-requisites:

Knowledge of basic Science and concrete ingredients, Manufacturing, & testing of concrete

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	3	-	-	-
CO3	-	3	-	-	-	-	3	-	2
CO4	-	-	-	3	2	-	-	-	-
CO5	-	-	-	-	-	1	1	3	-

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

Instructional Strategy:

NOTE 1: The course content shall be delivered through lectures, PowerPoint presentations, video demonstrations and field visits

NOTE 2: The Activity criteria shall be conducted / executed by the student and to be submitted to the faculty

CEH686	Advanced Concrete Technology	L	T	P	C
Theory		3	0	0	3

UNIT I	CEMENT CHEMISTRY	
Chemical composition-Bogue's Compounds-Oxide composition &Compound Composition-Hydration of cement-Heat of hydration-Heat evolution pattern & peaks-Calcium silicate hydrates-Calcium Hydroxide-Calcium Aluminate Hydrate-Interfacial Transition zone-Water requirement for hydration-Composition of cement paste at different stages of hydration.		9

Unit II	ADMIXTURES AND ITS CLASSIFICATIONS	
2.1 Admixtures Definition-Purposes-classification. **2.2** Chemical Admixtures-Plasticizers-basic products-Action of plasticizers, Super plasticizers-classification, -effect of super plasticizers-compatibility of plasticizer with cement- Marsh cone Test-Retarders-applications-retarding materials-retarding plasticizers, Accelerators-applications-accelerating plasticizers-Air-entraining admixture-advantages-air entraining agents-effect of air entrainment on properties of concrete. **2.3** Mineral admixtures-Pozzolana materials-Advantages-Fly ash-effect of fly ash on fresh concrete and hardened concrete, Ground granulated blast furnace slag (GGBS)-performance of GGBS in fresh and hardened concrete. Silica fumes- available forms-influence on fresh and hardened concrete.		9

UNIT III	DURABILITY, PERMEABILITY AND CORROSION	
3.1 Durability and Permeability Durability-Definition and significance- Cracking-Types and causes of cracks in concrete-Factors contributing to cracks in concrete-Plastic shrinkage cracks-Bleeding-		9

Drying Shrinkage-Sulphate Attack-Freezing and Thawing-Methods of controlling sulphate attack-Carbonation-Rate of carbonation-Alkali-silica reaction. Permeability-permeability of cement paste and concrete-causes for higher permeability. **3.2 Corrosion** Corrosion of reinforcement-Factors influencing corrosion-Damages caused by corrosion-Preventive measures.		
UNIT IV	**CONCRETE STRUCTURES IN SPECIAL ENVIRONMENTS**	
4.1 Underwater Construction Methods-Tremie and grouting method-Precautions required during underwater concreting. **4.2 Cold Weather concreting** Effect of cold weather on Concrete-Precautions to be Taken while Concreting in Cold Weather Conditions. **4.3 Hot Weather Concreting** Effect of hot weather on concrete-Precautions to be taken while Concreting in Hot Weather Conditions.		9
UNIT V	**SPECIAL CONCRETE**	
5.1 Light weight concrete Ingredients-Natural Aggregate-Artificial Aggregate-Factors influencing the strength and density of light weight concrete-Properties of light weight concrete **5.2 Fiber reinforced concrete** Fibers used-Factors effecting properties-volume of fibers-aspect ratio-orientation-work ability and compaction of concrete-size of coarse aggregates-applications **5.3 Polymer concrete**		9

list of polymers-type of polymer concrete-Polymer impregnated concrete-properties and applications **5.4 Self-compacting concrete** Requirements for SCC-Advantages-Tests methods (names only).	
TOTAL	**45**

Suggested List of Students Activity:

1. Study on Natural fibres and artificial fibres and prepare a report

2. Conduct market analysis on chemical admixtures and compare.

3. Compare the special concrete with conventional concrete and prepare report

4. Conduct Marsh cone Test to infer compatibility of super plasticizers and cement

5. List the cracks in concrete in a building and remedies

Text and Reference Books:

1. M.S.Shetty - Concrete Technology (Theory and Practice) - S.Chand& Company

Pvt. Ltd. New Delhi.

2. M L Gambhir - Concrete Technology - TATA McGraw-Hill Publishing Company

Limited, New Delhi

3. A.R.Santhakumar, Concrete Technology , Oxford University press.

4. A.M.Neville,&J.J.Brooks, Concrete Technology, ELBS with Longman edition

5. P.C.Varghese - Maintenance, Repair and rehabilitation & minor works of buildings-PHI Learning Private limited, New Delhi

Web-based/Online Resources:

https://archive.nptel.ac.in/courses/105/106/105106176/

https://freevideolectures.com/course/4450/nptel-advanced-concrete-technology

https://www.understanding-cement.com/hydration.html #

CEH687	Advanced Transportation Engineering	L	T	P	C
Theory		3	0	0	3

Introduction:

Advanced Transportation Engineering is a specialized field that delves into the intricate aspects of transportation systems. It aims to provide an overview about the highway with respect to planning, design, construction and maintenance as per IRC standards, specifications and methods. The key topics in this subject include Pavement Analysis and Design, Traffic Engineering, Mass transit system and bridge engineering.

Course Objectives:

The objective of this course is to

- Introduce the students with the practice of transportation engineering which focuses on highway, traffic and bridge engineering.
- Get Exposure to pavement evaluation in transportation engineering.
- Introduce recent advancements in the field of mass transit and road safety.
- Acquire knowledge in traffic engineering and management.
- Get adequate knowledge in various bridge structures.

Course Outcomes:

CO1 Understand properties and testing of pavement materials, subgrade evaluation, and bituminous materials for pavement construction.

CO2 Analyze pavement distress, evaluate pavement conditions using surface and structural methods, and understand pavement maintenance practices.

CO3 Conduct traffic engineering studies including traffic surveys, volume, capacity, speed, delay, parking, and intersection design.

CO4 Understand mass transit systems, urban transport planning, intelligent transportation systems (ITS), road safety concepts, and accident analysis.

CO5 Describe bridge engineering fundamentals including types of bridges, components, foundation types, and site selection criteria.

Pre-requisites:

Knowledge of basic highway and traffic engineering.

CO/PO & PSOs Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	3	-	-	-
CO3	-	2	1	-	-	-	3	1	2
CO4	-	3	-	3	2	-	-	-	-
CO5	-	-	-	-	-	1	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 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.

CEH687	Advanced Transportation Engineering	L	T	P	C
Theory		3	0	0	3

UNIT I	PAVEMENT MATERIALS AND CONSTRUCTION	
Aggregates- requirements, properties and testing of aggregates-Subgrade-significance and functions, Evaluation of soil strength-CBR and plate load test, preparation of subgrade-Bitumen and Tar -Tests on bitumen: Penetration test, Viscosity test, Ductility test, Softening point test, Specific gravity test, Flash and Fire point test-Bituminous emulsions and Cutback.		9
UNIT II	**PAVEMENT EVALUATION AND MAINTENANCE**	
Pavement evaluation –Causes of distress in rigid and flexible pavements –Evaluation based on surface appearance: cracks, patches and pot holes, undulations, raveling , roughness, skid resistance-Structural evaluation by Deflection measurements – Pavement Serviceability Index-Pavement maintenance (IRC Recommendations only).		9
UNIT III	**TRAFFIC ENGINEERING**	
Conventional and modern methods of traffic survey – Volume,Capacity and Density-Headway concepts and applications- speed and delay-origin and destination-Level of Services (LoS)-Parking facilities (on street, off street)-At grade intersection (rotary, channelization, traffic signal control)- Grade separated intersection and itstypes -Traffic sign and its types-Road Arboriculture.		9
UNIT IV	**MASS TRANSIT SYSTEM AND ROAD SAFETY SYSTEM**	
Various modes of mass transit and its Role - Urban transport system- NUTP and JNNURM-Unified Transport Authorities (UMTA and CUMTA)-Intelligent Transportation System (role in Traffic management and its advantages)-Applications of IoT in Transportation-Causes of accidents (human, vehicle, road factors)-Black Spot-Black route-Road safety audit (elements and its need).		9
UNIT V	**BRIDGE ENGINEERING**	

Bridge: Definition-Components of Bridge-Selection of type of bridge-scour-afflux-economic span-waterway-Factors governing the ideal site for bridge-Functions of foundation-Types of bridge foundations-Coffer dam and its types-classification of bridges (based on purpose and materials)-abutments-piers-wing walls-Continuous bridge, Cantilever bridge, Arch bridge, Suspension bridge.	9
TOTAL PERIODS	**45**

Suggested List of Students Activities:

- Presentation/Seminars by students on any recent technological developments in Highway Engineering.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Prepare Models of Traffic signs, pavements, road intersections, bridges etc.
- Visit near by road construction activities, traffic signals, Bridges .

Text and Reference Books:

1. Alkins and Harold," Highway Material",Prentice Hall, Pearson,2003.

2. . Nicholas T.Garber, Lester A Hoel, 'Traffic and Highway Engineering', Revised Second Edition, ITP, California, USA,1999.

3. S.K.Khanna C.E.G Justo,"highwayengineering", Nem Chand and Bros,Roorkee.

4.Rangwala," Highway Engineering ",Charotor Publishing House Pvt Ltd.,Edition 2010.

5. kadiyalilr,"trafficengineering and Transportation Planning",Khanna Publishers, Delhi,2006.

6 IRC 37-2001," Guidelines for the Design of Flexible Pavements", Indian Road Congress.

7 IRC 58-2002," Guidelines for the Design of Plain Jointed Rigid Pavements For Highways", Indian Road Congress.

Web-based/online resources:

Pavement Materials : https://youtu.be/3oNa9Z94Hiw?si=KaE7Cu7w6SvwVdek

Pavement Design : https://youtu.be/5DGYmSXXStg?si=umVV7FDl6D2YtI01

https://youtu.be/oju-XCy-MJU?si=43SHkPRIgr0wh4sd

Traffic Engineering : https://youtu.be/4ej1XkAvzhc?si=uMzVhFt7rpseA9Wu

Mass Transit System : https://youtu.be/O9OR-IpX32I?si=Sn7uw3bF_o89BPKM

Bridge Engineering : https://youtu.be/RB2k5hSYO3U?si=7B0sA6N36OOjDh8T

CEH688	Advanced Surveying	L	T	P	C
Theory		3	0	0	3

Introduction:

Advanced surveying techniques encompass a diverse array of methods and technologies employed to accurately measure, map, and analyze the Earth's surface and its features. These techniques often go beyond traditional surveying methods, incorporating cutting-edge technologies and sophisticated methodologies to achieve precise and comprehensive results. One facet of advanced surveying involves the utilization of satellite-based positioning systems such as GPS (Global Positioning System), GNSS (Global Navigation Satellite System), and GIS (Geographic Information System). These systems enable surveyors to determine precise coordinates of points on the Earth's surface, facilitating accurate mapping, navigation, and geospatial analysis. Overall, advanced surveying plays a pivotal role in various fields including urban planning, civil engineering, environmental management, disaster response, and natural resource exploration. By harnessing the power of advanced technologies and methodologies, surveyors can generate precise geospatial data essential for informed decision-making, sustainable development, and effective resource management.

Course Objectives:

The object of this course is to enable the student to

- Introduction to Engineering Survey Understanding the basic terms & Principles of Surveys.
- Gain Knowledge about Modern surveying Instruments.
- Students can able to Understand the Hydrographic And Astronomical Surveying
- Students can able to understand the Knowledge of Remote Sensing.
- Students can able to understand the Knowledge of Photogrammatery.

Course Outcomes:

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

CO1 Perform and apply reconnaissance, preliminary, and location surveys for engineering projects, including setting out horizontal and vertical curves using conventional methods.

CO2 Operate and utilize modern surveying instruments such as electronic theodolites, total stations, EDM, GPS, and GIS for accurate data acquisition and processing in civil engineering applications.

CO3 Conduct hydrographic and astronomical surveys, including measurement of tides, soundings, celestial observations, and river discharge calculations.

CO4 Understand the principles and applications of remote sensing in civil engineering, including electromagnetic spectrum interactions and sensor classifications.

CO5 Apply photogrammetry principles for aerial photography, stereoscopic depth perception, parallax measurement, and planimetric mapping.

Pre-requisites:

Knowledge of basic Surveying

CO/PO & PSOs Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	2	-	-	-	-	-	-
CO3	-	-	1	-	1	2	-	1	2
CO4	-	-	-	3	2	-	1	-	-
CO5	-	-	-	-	-	1	1	-	-

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

CEH688	Advanced Surveying	L	T	P	C
Theory		3	0	0	3

UNIT I	ENGINEERING SURVEYS	
1.1 Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways 1.2 Horizontal and vertical curves - Simple curves - Setting with chain and tapes, Tangential angles by theodolite, double theodolite - Setting out by offsets and angles - Vertical curves - Mine Surveying - instruments - Tunnels - Correlation of under ground and surface surveys – Shafts.		9

UNIT II	MODERN SURVEYING INSTRUMENTS	
2.1 Electronic Theodolites - component parts -set up- working principles –temporary adjustments - Total stations - uses-component parts - EDM, Electronic field book - Advantages – Parts and accessories - working principle – Observables – Errors - COGO functions – Field procedure and applications. 2.2 GPS: Advantages - System components– receiver components and antenna – Planning and data acquisition – Data processing - Errors in GPS – Field procedure and applications. Geographical information systems (GIS) - map definitions, map projections data entry importance, use and application of GIS in Civil Engineering.		10

UNIT III	HYDROGRAPHIC AND ASTRONOMICAL SURVEYING	
3.1 Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods - Three-point problem (Lehmann's Method,Bessels Method, Mechanical Method) - Strength of fix - Sextants and station pointer - River surveys - Measurement of current and discharge - Celestial sphere. 3.2 Astronomical terms and definitions - Motion of sun and stars - Apparent altitude and corrections - Celestial co-ordinate systems - Different time systems - use of Nautical almanac - Star constellations.		8

UNIT IV	INTRODUCTION TO REMOTE SENSING	
4.1 Remote sensing - Introduction and applications in Civil Engineering– components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods.		10

4.2 Electromagnetic Spectrum-Standard atmospheric profile –interaction of radiation with atmosphere – Scattering, absorption and refraction -Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water -Classification of remote sensors.		
UNIT V	**INTRODUCTION TO PHOTOGRAMMETRY**	
5.1 Principles - Stereoscopic depth perception – aerial photo-aerial camera -Scale – overlaps – stereoscopy – concepts – viewing and measuring system – principle of floating mark 5.2 Methods of parallax measurement – vertical photographs – geometry, scale, parallax equations, Planimetric mapping – Tilted photograph – Geometry, Coordinate system, Scale, Planimetric mapping.		8
TOTAL PERIODS		45

List of Suggested Student Activities:

- Collect the information on survey instruments available in the market with specifications.
- Watch educational videos on various advanced surveying methods to understand the concepts.

Text /Reference:

- B.C.Punmia : Surveying - II; Laxmi publications
- T.P.Kanetkar& Kulkarni Surveying and Levelling (Vol I& Vol II; Jain book
- depot 2
- Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
- Patel .A.N: Remote Sensing Principles & Applications; Scientific Publishers 6
- NITTTR, Chennai: AICTE Continuing Education module on Geographical
- information systems

Web-based/Online Resource

Setting out of simple curve - https://www.youtube.com/watch?v=am3MYbQApz8

EDM - https://www.youtube.com/watch?v=HImugNxfDhU

HYDROGRAPHIC SURVEYING - https://www.youtube.com/watch?v=ZkZbVOdaXHs

GIS - https://www.youtube.com/watch?v=rEzgU6Ds_5c

REMOTE SENSING AND GIS - https://www.youtube.com/watch?v=Cy2Oy9iJTbY

TYPES OF PHOTOGRAMMETRY **- https://www.youtube.com/watch?v=VliVvNrV_vU**

CEH679	Artificial Intelligence and Machine Language in Construction Management	L	T	P	C
Practicum		1	0	4	3

Course Description:

This course explores the transformative impact of Artificial Intelligence (AI) and Machine Learning (ML) on construction management. It aims to equip students with the knowledge and skills needed to leverage AI and ML technologies to optimize construction processes, improve project outcomes, and enhance decision-making. Through a combination of theoretical understanding and practical application, students will learn how to implement these advanced technologies in real-world construction scenarios. The course aims to bridge the gap between advanced technology and practical construction management, preparing students to lead the future of the construction industry with cutting-edge AI and ML capabilities.

Course Objectives:

The objective of this course is to enable the student:

- Understand the fundamental concepts of AI and ML.
- Explore the applications of AI and ML in the construction industry.
- Analyze the benefits and challenges of integrating AI and ML in construction management.
- Develop practical skills in using AI and ML tools for construction project planning, scheduling, and risk management.
- Evaluate case studies of AI and ML implementations in construction projects.

Course Outcomes:

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

CO1 Develop proficiency in Python programming including data types, control flow, functions, and fundamental libraries (NumPy, Pandas, Scikit-Learn, Matplotlib) relevant to data science applications in construction management.

CO2 Understand and apply machine learning algorithms such as linear regression, K-Nearest Neighbor, decision trees, K-Means clustering, and principal component analysis for construction project estimation, labor prediction, and material requirement forecasting.

CO3 Comprehend artificial intelligence concepts including artificial neural networks, multi-layer perceptron's, generative AI, and prompt engineering, and their applications in smart construction equipment and civil engineering.

CO4 Implement practical AI and ML applications in construction management through hands-on exercises involving cost estimation, labor and material prediction, project efficiency improvement, and time overrun estimation.

Pre-requisites: NIL

CO/PO & PSOs Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	3	-	-	-
CO3	-	2	1	-	-	-	3	1	2
CO4	-	3	-	3	2	-	-	-	-

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

Instructional Strategy:

- Lecture
- Presentation
- Demonstration
- Discussion

CEH679	Artificial Intelligence and Machine Language in Construction Management	L	T	P	C
Practicum		1	0	4	3

UNIT I	**PYTHON PROGRAMMING**	
	Variables, Data types, Control flow statements: if, looping statements (for and while); Functions; Creation, manipulation, and common operations: Lists, Tuples, Dictionaries and Sets: Fundamental Python Libraries for Data Scientists: Numpy, ScikitLearn, Pandas, Matplotlib;	**5**
UNIT II	**MACHINE LEARNING**	
	Introduction to Machine Learning: ML Types, Regression: Linear Regression; Classification: K-Nearest Neighbour (KNN), and Decision Tree - Unsupervised algorithm: K-Means algorithm; Dimensionality Reduction – Principal Component Analysis (PCA) Algorithm	**5**
UNIT III	**ARTIFICIAL INTELLIGENCE**	
	Multi-Layer Perceptron, Artificial Neural Network, Introduction to generative AI, Prompt Engineering - Introduction to AI in Civil Engineering, Use of AI in Smart Construction Equipment.	**5**
	PRACTICAL EXERCISES	
1	Sample programs using conditional and looping statements	**5**
2	Sample Programs for List, Array, Dictionary and Set	**4**
3	Data Manipulation with Pandas; Sample programs to pre-process and visualize data.	**4**

4	ML - Estimation of the cost of a construction project using linear regression	**4**
5	ML - Prediction of Labour requirement for a project using KNN	**4**
6	ML - Prediction of salaries of the employee in a construction site using decision tree	**4**
7	ML - Concrete strength prediction using Random Forest Regression	**4**
8	ML – Using K Means clustering to improve construction project efficiency	**4**
9	ML - Perform univariate and multivariate time series forecasting	**4**
10	ML - Prediction of Material requirement for a project.	**4**
11	ML - Estimation of time overruns in a project using ANN	**4**
	TOTAL PERIODS	**75**

Suggested List of Students Activity:

1. Tracking worker movements and safety compliance using ML
2. Weather related delays using ML algorithm.
3. Minimising material cost and resource optimization in the Construction fields.
4. Develop AI systems to monitor safety compliance on construction sites.
5. Analyse historical data to predict risks using ML Algorithms.

Text and Reference Books:

- Artificial Intelligence in Construction" by Matthew Sadiku
- Machine Learning for Construction" by Tom Smith.
- Big Data and AI Strategies for Construction" by Jane Doe
- “Artificial Intelligence and Machine Learning Techniques for Civil Engineering (Advances in Civil and Industrial Engineering) “ Vagelis Plevris (Editor), Afaq Ahmad (Editor), Nikos D. Lag

- “Machine Learning for Civil and Environmental Engineers: A Practical Approach to Data-Driven Analysis, Explainability, and Causality”, M. Z. Naser

Web-based/Online Resources:

1. Suggested Journals : Journal of Computing in Civil Engineering (ASCE)

2. **https://www.constructiondive.com/** for live construction news updation

3. Learning Path: "AI and Machine Learning Foundations" from coursera.

4. AI tools – Copilot.ai,Bard.ai,Chatgpt.ai etc.

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)

Computers- 30

Softwares used :

- Pycharm
- Anaconda python
- Data set : Kaggle ,Github ,data.gov etc

CEH67A	Structural Detailing for RCC Elements	L	T	P	C
Practicum		1	0	4	3

Introduction:

This is a core subject which covers broad elements of RCC detailing. This is an important subject that deals with the detailing of RCC structural elements. Diploma holders in Civil Engineering will be required to supervise the civil works with structural drawings. They may also be required to design and detail simple structural elements, make changes in detailing and drafting procedure depending upon the availability of materials (bars of different diameters). This subject thus deals with elementary detailing principles as per BIS code of practice BIS: 456 - 2000 by limit state method.

Course Objectives:

The objectives of the course is to enable the students to

- Detailing and drafting of simple RCC elements like singly, doubly reinforced rectangular beams, and singly reinforced simply supported T-beams for flexure and shear.
- Detailing and drafting of One way/ Two way simply supported slabs.
- Design Axially loaded Columns and Footings.

Course Outcomes:

CO1 Understand the properties of reinforcement materials and the concept of development of stress and curtailment in reinforcement for RCC beams as per IS 456:2000.

CO2 Prepare detailed drawings and reinforcement detailing of simply supported, singly and doubly reinforced beams and cantilever beams following codal provisions.

CO3 Detail and draft one-way, two-way, and continuous slabs including tension and torsion reinforcements as per IS 456:2000.

CO4 Understand and apply detailing requirements for columns, including longitudinal and transverse reinforcement, and prepare detailed drawings for square and rectangular columns.

CO5 Prepare detailed reinforcement drawings for isolated square and rectangular footings as per IS 456:2000 codal provisions.

Pre-requisites:

Design of R.C.C Structures

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	1	-	-	-
CO3	-	1	2	-	-	-	2	1	2
CO4	-	-	-	3	2	-	-	-	-
CO5	-	-	-	-	-	2	1	-	-

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

Instructional Strategy

- This subject is introduced so that diploma holder in Civil Engineering may appreciate the concepts and principles of RCC structural elements of buildings and are able to apply the knowledge gained through the subjects of mechanics of materials and mechanics of structures. The detailing of simple structural elements like beams, slabs, column and footings will be demonstrate to the students to expose them in the field.
- Teacher should give simple exercises involving the applications of various concepts and principles being taught in the subject.
- Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve the tutorial problems independently and visit to local construction site to understand the behavior and uses of structural elements.
- Teacher may conduct weekly small quiz sessions to know the students' level of understanding.

CEH67A	Structural Detailing for RCC Elements	L	T	P	C
Practicum		1	0	4	3

UNIT I	**DETAILING OF SIMPLY SUPPORTED, SINGLY AND DOUBLY REINFORCED BEAMS AND CANTILEVER BEAMS AS PER IS 456- 2000**	
	Concept of Reinforced Cement Concrete (RCC) – Types of Reinforcement Materials - Suitability of steel as reinforcing material - Properties of mild steel, HYSD steel and TMT bars -Loading on structures as per IS: 875 - Development of stress in reinforcement - Curtailment of reinforcements - Detailing and drafting Concept of simply supported singly and doubly reinforced beams and cantilever beams as per IS 456 -2000.	5
	Practical exercises:	
	1. Detailing and Drafting of Singly Reinforced simply supported beam as per codal provisions.	5
	2. Detailing and Drafting Doubly Reinforced simply supported beam as per codal provisions.	5
	3. Detailing and drafting of cantilever beam as per codal provisions.	5
UNIT II	**DETAILING OF ONE WAY, TWO WAY AND CONTINUOUS SLABS AS PER IS 456- 2000**	
	Requirements governing slab reinforcements and detailing of slabs as per IS 456 – 2000 -Detailing and drafting of one-way, two-way slab (Corners are not held down and corners held down) - Tension and Torsion reinforcement requirements.	5
	Practical exercises:	
	4. Detailing and drafting of one-way slab as per codal provisions.	5
	5. Detailing and drafting of two-way slab as per codal provisions- Corners are not held down (All the Four edges discontinuous case)	5
	6. Detailing and drafting of two-way slab as per codal provisions corners held down (All the Four edges discontinuous case)	5
	7. Detailing and drafting of one-way Continuous slab as per codal provisions.	5
	8. Detailing and drafting of two-way Continuous slab as per codal provisions	5

UNIT III	DETAILING OF COLUMNS AND FOOTING AS PER IS 456- 2000	
	Requirements governing longitudinal and transverse reinforcement of column as per IS 456 - arrangement of transverse and longitudinal reinforcement as per IS 456 - detailing and drafting of axially loaded short columns for reinforcement distributed equally on two/four sides and footing as per IS code.	5
	Practical exercises:	
	9. Detailing and drafting of square column as per codal provisions.	5
	10. Detailing and drafting of rectangular column as per codal provisions.	5
	11. Detailing and drafting of isolated square footing as per codal provisions.	5
	12. Detailing and drafting of isolated rectangular footing as per codal provisions.	5
	TOTAL	75

Suggested List of Students Activities:

- Visits to nearby construction site and study about
- Foundation and Footings
- Column reinforcements
- Grade beam and lintel level beam reinforcement arrangements
- Reinforcement details for beams and slabs
- Study the bar bending details of structural drawings.
- Learning the reinforcement arrangements given in SP- 34 (Hand book on concrete reinforcement and detailing)

Reference Books

- B.C.Punmia, “Limit state Design of Reinforced concrete”, Lakshmi publications, Delhi.
- P.C.Varghese, “Limit state design of reinforced concrete”, PHI Learning Pvt. Ltd.
- S.R.Karve and V.L Shah,” Limit state theory and design of reinforced concrete”,
    - Pune VidyaGrihaPrakashan.
- Dr.S.Ramachandra,” Limit state design of concrete structures”, Scientific Publisher.
- N.Krishnaraju,” Reinforced concrete Design”, New age International Publications.
- S.S.Bhavikatti, “Design of RCC and structural elements”, New age International Publications.

- IS 456 -2000, IS 875-1987, SP34 - 1987, BIS.

Web-based/Online Resources		
Limit state method	:	https://youtu.be/jhVh4qNa_x8?si=YNSfiPtXo1DDZANC
Analysis of singly reinforced beams	:	https://youtu.be/o4-EAjGhzSw?si=IlD2GPM_ZcvIqx3e
Design of flanged beams in flexure	:	https://youtu.be/BOtUb1yk8sI?si=RSfF6k9F_SHnZium
Design of slabs	:	https://youtu.be/TQLehidE6Hc?si=eTEtZDufiXFmvp9-
Design of columns	:	https://youtu.be/n-D56dTyiyk?si=SGY0E46YRd1LZucG

LIST OF EQUIPMENTS (for a batch of 30 students):

S. No.	List of Equipment's required	Quantity Required
1	Computers	30 Nos.
2	Laser printer	2 Nos.
3	CAD software	30 Users

CEH67B	Design and Drawing of Steel Elements	L	T	P	C
Practicum		1	0	4	3

Introduction:

A steel structure, a metal structure is made of structural steel components connected to each other to carry loads and provide rigidity. The subject deals with the basic concepts and principles, their application in drafting and detailing tension members, compression members and connections. Construction.

Course Objectives:

- The objectives of the course is to enable the students to
- Express bout steel and its importance
- Know the importance of steel in construction.
- Know the use of steel code and steel tables
- Know the importance of steel code for the design
- Know the various types of steel
- Know the types of connections
- Apply the knowledge of connections
- Know the types of connections
- Assess the drafting and detailing of tension members
- Assess the drafting and detailing of compression members
- Assess the drafting and detailing of connections

Course Outcomes:

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

CO1: Understand and apply IS 800:2007 specifications for bolted and welded steel connections, including types, patterns, and detailing requirements.

CO2: Analyze and detail tension members, including net sectional area, failure modes, and connections using lug angles and gusset plates.

CO3: Design and prepare detailed drawings for compression members including built-up columns

with lacing and battens as per IS 800:2007.

CO4: Detail laterally supported and unsupported steel beams and plate girders, understanding design requirements and drafting practices.

CO5: Prepare detailed drawings and understand the structural behavior of various roof truss types including Pratt, Fink, and North light roof trusses.

Pre-requisites: Properties of Steel, Types and Shapes Steel Elements.

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	3	-	-	-
CO3	-	2	1	-	-	-	3	1	2
CO4	-	3	-	3	2	-	-	-	-
CO5	-	-	-	-	-	1	1	-	-

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

Instructional Strategy:

- To help the students to learn and appreciate the concepts in drafting and detailing the members and connections.
- Theory- demonstrate- practice – activity may be used to ensure that learning is outcome- and employability based.
- Visits to different construction activities has to be planned on all the topics.

CEH67B	Design and Drawing of Steel Elements	L	T	P	C
Practicum		1	0	4	3

UNIT I	**SIMPLE CONNECTION-BOLTED AND WELDED CONNECTION**	
	Introduction -Bolted connection-types of bolts-Types of bolted joints-lap and butt joint-main plate, cover plate, packing plate, tack bolts-Patterns of bolted joints-chain, Staggered, diamond-IS 800 2007 Specifications for bolted joints-Diameter of bolts, pitch, Gauge, edge distance, end distance. Welded connection-Types of weld-fillet weld, butt weld or groove, plug weld, slot weld, Spot weld-IS 800 2007 Specifications for welded joint-size, effective throat thickness, Effective length, overlap-intermittent weld.	3
	Practical exercises:	
	1. Detailing and drafting of double cover butt joint with packing plate and bolt arranged in diamond pattern.	4
	2. Detailing and drafting of end connection of ISA tie member with gusset plate by fillet weld.	4
	3. Detailing and drafting of end connection of Channel tie member with gusset plate by slot weld and plug weld.	4
UNIT II	**TENSION MEMBERS**	
	Tension members-types of tension members-Net sectional area- Types of failure-yielding failure, rupture failure and block shear failure-Lug angle-Splice.	3
	Practical exercises:	
	4. Draw the block shear failure of angle tie member connected to gusset plate by a) Single bolted connection. b) Double bolted connection.	4
	5. Detailing and drafting of Channel tension member connected to gusset plate using lug angle by bolted connection.	4

	6. Detailing and drafting of tension member consisting of two angles placed back-to-back connected to gusset plate using lug angle by bolted connection.	4
UNIT III	**COMPRESSION MEMBERS**	
	Introduction-Compression members- effective length-slenderness ratio-Design of simple compression member-Built-up column-Lacing-Batten-IS 800 2007 provision for built-up column-Splice.	3
	Practical exercises:	
	7. Detailing and drafting of built-up column of two channels face-to-face connected by single lacing	4
	8. Detailing and drafting of built-up column of two channels back-to-back connected by double lacing.	4
	9. Detailing and drafting of built-up column of two channels face-to-face connected by battens.	4
UNIT IV	**BEAMS**	
	Beams-Laterally supported and laterally unsupported beams-Design of simple steel beam-Plate girder.	3
	Practical exercises:	
	10. Detailing and drafting of laterally unsupported beam.	4
	11. Detailing and drafting of laterally supported beam.	4
	12. Detailing and drafting of plate girder.	4
UNIT V	**ROOF TRUSS**	
	Truss-Components of truss-Types of truss-Pratt truss, Warren truss, Fink truss, King post truss, Queen post truss, Howe truss, North light roof truss	3
	13. Detailing and drafting of Pratt truss	4
	14. Detailing and drafting of Fink truss	4
	15. Detailing and drafting of North light roof truss	4
	TOTAL PERIODS	75

Suggested List of Students Activity:

- Seminar on the different types of steel, joints and application.
- Periodic quizzes based on the topic.
- Industrial visit to know about the real- world application.

TEXT BOOKS

1. Duggal S.K., Design of Steel Structures, Tata McGraw Hill, Publishing Co. Ltd., New Delhi, 2010
2. Bhavikatti S.S, Design of Steel Structures, Ik International Publishing House, New Delhi, 2017.

REFERENCES

- Gambhir M L, Fundamentals of Structural Steel Design, McGraw Hill Education India Pvt Limited, 2003
- Jack C. McCormac and Stephen F Csernak, Structural Steel Design, Pearson Education Limited, 2013
- Sarwar Alam Raz, Structural Design in Steel, New Age International Publishers, 2014
- Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi, 2016

Web-based/Online Resources:

- Nptel-Design of steel structures. https://archive.nptel.ac.in/courses/105/105/105105162/
- http://ecoursesonline.iasri.res.in/course/view.php?id=64

Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)

S. No.	List of Equipment's required	Quantity Required
1	Computers	30 Nos.
2	Laser printer	2 Nos.
3	CAD software	30 Users

CEH67C	In-house Project	540 Periods	C
Project			12

Introduction

Every student must do one major project in the Final year of their program. Students can do their major project in Industry or R&D Lab or in-house or a combination of any two for the partial fulfillment for the award of Diploma in Engineering.

For the project works, the Department will constitute a three-member faculty committee to monitor the progress of the project and conduct reviews regularly.

If the projects are done in-house, the students must obtain the bonafide certificate for project work from the Project supervisor and Head of the Department, at the end of the semester. Students who have not obtained the bonafide certificate are not permitted to appear for the Project Viva Voce examination.

For the projects carried out in Industry, the students must submit a separate certificate from Industry apart from the regular bonafide certificate mentioned above. For Industry related projects there must be one internal faculty advisor / Supervisor from Industry (External), this is in addition to the regular faculty supervision.

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.

Objectives

Academic project work plays a crucial role in the education of Diploma in Engineering students, as it helps them apply theoretical knowledge to practical situations and prepares them for real-world engineering challenges.

- **Integration of Knowledge**: Consolidate and integrate theoretical knowledge acquired in coursework to solve practical engineering problems.
- **Skill Development**: Enhance technical skills related to the specific field of engineering through hands-on experience and application.

- **Problem-Solving Abilities**: Develop critical thinking and problem-solving abilities by addressing complex engineering issues within a defined scope.
- **Project Management**: Gain experience in project planning, execution, and management, including setting objectives, timelines, and resource allocation.
- **Teamwork and Collaboration**: Foster teamwork and collaboration by working in multidisciplinary teams to achieve project goals and objectives.
- **Research Skills**: Acquire research skills by conducting literature reviews, gathering relevant data, and applying research methodologies to investigate engineering problems.
- **Innovation and Creativity**: Encourage innovation and creativity in proposing and developing engineering solutions that may be novel or improve upon existing methods.
- **Communication Skills**: Improve communication skills, both oral and written, by presenting project findings, writing technical reports, and effectively conveying ideas to stakeholders.
- **Ethical Considerations**: Consider ethical implications related to engineering practices, including safety, environmental impact, and societal concerns.
- **Professional Development**: Prepare for future professional roles by demonstrating professionalism, initiative, and responsibility throughout the project lifecycle.

Course Outcomes

CO1: Define clear, specific, and achievable objectives aligned with the project scope and purpose.

CO2: Conduct comprehensive literature reviews to identify research gaps and justify the project's contribution.

CO3: Develop and justify appropriate research design and methodology for effective project execution.

CO4: Plan and manage the project effectively, adhering to timelines and milestones.

CO5: Document project details comprehensively with clarity and completeness.

CO-PO Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	1	-	-	3	-	-	-
CO3	-	1	1	-	3	-	3	1	2
CO4	-	3	-	2	2	-	-	-	-
CO5	-	-	3	-	-	1	1	-	-

Important points to consider to select the In-house project.

- Selecting a project work in Diploma Engineering is a significant decision that can greatly influence your learning experience and future career prospects.
- Choose a project that aligns with your career aspirations and interests within the field of engineering. Consider how the project can contribute to your professional development and future opportunities.
- Ensure the project aligns with your coursework and specialization within the Diploma program. It should complement and build upon the knowledge and skills you have acquired in your studies.
- Evaluate the scope of the project to ensure it is manageable within the given timeframe, resources, and constraints. Avoid projects that are overly ambitious or impractical to complete effectively.
- Assess the availability of resources needed to conduct the project, such as equipment, materials, laboratory facilities, and access to relevant software or tools. Lack of resources can hinder project progress.
- Select a project that genuinely interests and motivates you. A project that captures your curiosity and passion will keep you engaged and committed throughout the project duration.
- Consider the availability and expertise of faculty advisors or industry mentors who can provide guidance and support throughout the project. Effective mentorship is crucial for success.
- Clearly define the learning objectives and expected outcomes of the project. Ensure that the project will help you achieve specific learning goals related to technical skills, problem-solving, and professional development.

- Look for opportunities to propose innovative solutions or explore new methodologies within your project. Projects that encourage creativity can set you apart and enhance your learning experience.
- Consider ethical implications related to the project, such as safety protocols, environmental impact, and compliance with ethical guidelines in research and engineering practices.
- Evaluate whether the project offers opportunities for collaboration with peers, experts from other disciplines, or industry partners. Interdisciplinary projects can broaden your perspective and enhance your teamwork skills.
- Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.

By carefully considering these points, Diploma Engineering students can make informed decisions when selecting project work that not only enhances their academic learning but also prepares them for successful careers in engineering.

Duties Responsibilities of the internal faculty advisor.

Each group should have an internal faculty advisor assigned by the HOD/Principal.

- The in-house project should be approved by the project monitoring committee constituted by the Chairman Board of Examinations.
- The in-house project should be selected in the fifth semester itself. Each in-house project shall have a maximum of four students in the project group.
- Provide comprehensive academic advising to help in the selection of appropriate in-house project that align with their interests and career goals.
- Offer expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between students and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.

- Ensure students have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of the in-house project, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Instill and uphold high ethical and professional standards, encouraging students to practice integrity and responsibility in their work.
- Assist in preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development .
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

Instructions to the students.

- Regularly meet with your internal faculty advisor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your faculty advisor.
- Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in in-house projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.
- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.

- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.
- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

Documents to be submitted by the student for an in-house project.

Submit a printed report of your in-house project work along with the fabrication model / analysis report for the End Semester Examination.

Rubrics for In-House Project Work

Sl. No.	Topics	Description
1	Objectives	Clearly defined and specific objectives outlined. Objectives align with the project's scope and purpose.
2	Literature Review	Thorough review of relevant literature. Identification of gaps and justification for the project's contribution.
3	Research Design and Methodology	Clear explanation of the research design. Appropriateness and justification of chosen research methods.
4	Project Management	Adherence to project timeline and milestones. Effective organization and planning evident in the project execution.
5	Documentation	Comprehensive documentation of project details. Clarity and completeness in recording methods, results, and challenges.
6	Presentation Skills	Clear and articulate communication of project findings. Effective use of visuals, if applicable.
7	Analysis and Interpretation	In-depth analysis of data. Clear interpretation of results in the context of research questions.

8	Problem-Solving	Demonstrated ability to identify and address challenges encountered during the project. Innovative solutions considered where applicable.
9	Professionalism and Compliance	Adherence to ethical standards in research. Compliance with project guidelines and requirements.
10	Quality of Work	Overall quality and contribution of the project to the field. Demonstrated effort to produce high-quality work.

CEH67D	Internship	Periods	C
Project		520	12

Introduction

Internships in educational institutions are designed to provide students with practical experience in their field of study and to bridge the gap between academic knowledge and professional practice.

Objectives

After completing Internship, Interns will be able to,

- Apply the theoretical knowledge and skill during performance of the tasks assigned in internship.
- Demonstrate soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship.
- Document the Use case on the assigned Task.
- Enable interns to apply theoretical knowledge gained in the classroom to real-world practical applications.
- Provide hands-on experience in the industrial practices.
- Develop essential skills such as communication, organization, teamwork, and problem-solving.
- Enhance specific skills related to the intern's area of focus.
- Offer a realistic understanding of the daily operations and responsibilities.
- Provide opportunities to work under the guidance of experienced supervisors and administrators.
- Allow interns to explore different career paths.
- Help interns make informed decisions about their future career goals based on first hand experience.
- Facilitate the establishment of professional relationships with supervisor, administrators, and other professionals in the field.
- Provide access to a network of contacts that can be beneficial for future job opportunities and professional growth.
- Foster personal growth by challenging interns to step out of their comfort zones and take on new responsibilities.
- Build confidence and self-efficacy through successful completion of internship tasks and projects.

- Allow interns to observe and understand the implementation of standards and policies in practice.
- Provide opportunities for constructive feedback from supervisors and mentors, aiding in the intern's professional development.
- Enable self-assessment and reflection on strengths, areas for improvement, and career aspirations.
- Encourage sensitivity to the needs and backgrounds of different groups, promoting inclusive and equitable industrial practices.

Course Outcomes

CO1 Demonstrate improved skills.

CO2 Exhibit increased professional behavior.

CO3 Apply theoretical knowledge and principles in real-world practices.

CO4 Develop and utilize assessment tools to evaluate the learning and practices.

CO5 Engage in reflective practice to continually improve their learning and professional growth.

Facilitating the Interns by an Internship Provider.

- Orient intern in the new workplace. Give interns an overview of the organization, Explain the intern's duties and introduce him or her to co-workers.
- Develop an internship job description with clear deliverables and timeline.
- Allow the interns in meetings and provide information, resources, and opportunities for professional development.
- The interns have never done this kind of work before, they want to know that their work is measuring up to organizational expectations, hence provide professional guidance and mentoring to the intern.
- Daily progress report of Intern is to be evaluated by industry supervisor. Examine what the intern has produced and make suggestions. Weekly supervision meetings can help to monitor the intern's work.

Duties Responsibilities of the Faculty Mentor

- To facilitate the placement of students for the internship
- To liaison between the college and the internship provider
- To assist the Industrial Training Supervisor during assessment

Instructions to the Interns

- Students shall report to the internship provider on the 1st day as per the internship schedule.
- Intern is expected to learn about the organization, its structure, product range, market performance, working philosophy etc.
- The interns shall work on live projects assigned by the internship provider.
- The Intern shall record all the activities in the daily log book and get the signature of the concerned training supervisor.
- Intern shall have 100% attendance during internship programme. In case of unavoidable circumstances students may avail leave with prior permission from the concerned training supervisor of the respective internship provider. However, the maximum leave permitted during internship shall be as per company norms where they are working and intern shall report the leave sanctioned details to their college faculty mentor.
- The interns shall abide all the Rules and Regulations of internship provider
- Intern shall follow all the safety Regulations of internship provider.
- On completion of the internship, the intern shall report to the college and submit the internship certificate mentioning duration of internship, evaluation of interns by internship provider, Student's Diary and Comprehensive Training Report.

CO-PO & PSO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	1	-	-	3	-	-	-
CO3	-	1	1	-	3	-	3	1	2
CO4	-	3	-	2	2	-	-	-	-
CO5	-	-	3	-	-	1	1	-	-

Attendance Certification

Every month students have to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution supervisor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

Training Reports

The students have to prepare two types of reports: Weekly report in the form of diary to be submitted to the concerned staff in-charge of the institution. This will be reviewed while awarding Internal

Industrial Training Diary

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these progress reports.

Comprehensive Training Report

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant/product/process/construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training.

Any data, drawings etc. should be incorporated with the consent of the Organization.

CEH67E	Fellowship	Periods	C
Project		520	12

Introduction

The Fellowship in the Diploma in Engineering program is designed to provide aspiring engineers with a comprehensive educational experience that combines theoretical knowledge with practical skills. This fellowship aims to cultivate a new generation of proficient and innovative engineers who are equipped to meet the challenges of a rapidly evolving technological landscape.

Participants in this fellowship will benefit from a robust curriculum that covers core engineering principles, advanced technical training, and hands-on projects. The program emphasizes interdisciplinary learning, encouraging fellows to explore various branches of engineering, from mechanical and civil to electrical, electronics & communication and computer engineering. This approach ensures that graduates possess a versatile skill set, ready to adapt to diverse career opportunities in the engineering sector.

In addition to academics, the fellowship offers numerous opportunities for professional development. Fellows will engage with industry experts through seminars, workshops, and internships, gaining valuable insights into real-world applications of their studies. Collaborative projects and research initiatives foster a culture of innovation, critical thinking, and problem-solving, essential attributes for any successful engineer.

By offering this fellowship, participants become part of a vibrant community of learners and professionals dedicated to advancing the field of engineering. The program is committed to supporting the growth and development of each fellow, providing them with the tools and resources needed to excel both academically and professionally.

The Fellowship in the Diploma in Engineering is more than just an educational endeavor; it is a transformative journey that equips aspiring engineers with the knowledge, skills, and experiences necessary to make significant contributions to society and the engineering profession.

Objectives

After completing students will be able to,

- Provide fellows with a solid foundation in core engineering principles and advanced technical knowledge across various engineering disciplines.
- Equip fellows with hands-on experience through laboratory work, projects, and internships, ensuring they can apply theoretical knowledge to real-world scenarios.

- Promote interdisciplinary understanding by encouraging exploration and integration of different engineering fields, fostering versatility and adaptability in fellows.
- Encourage innovation and creativity through research projects and collaborative initiatives, enabling fellows to develop new solutions to engineering challenges.
- Facilitate professional growth through workshops, seminars, and interactions with industry experts, preparing fellows for successful careers in engineering.
- Develop critical thinking and problem-solving skills, essential for tackling complex engineering problems and making informed decisions.
- Strengthen connections between academia and industry by providing opportunities for internships, industry visits, and guest lectures from professionals.
- Foster leadership qualities and teamwork skills through group projects and collaborative activities, preparing fellows for leadership roles in their future careers.
- Instill a sense of ethical responsibility and awareness of the social impact of engineering practices, encouraging fellows to contribute positively to society.
- Promote a culture of lifelong learning, encouraging fellows to continually update their knowledge and skills in response to technological advancements and industry trends.
- Prepare fellows to work in a global engineering environment by exposing them to international best practices, standards, and cross-cultural experiences.

Course Outcomes

CO1 Align project work effectively with clearly defined objectives and requirements.

CO2 Conduct in-depth research with comprehensive literature review and gap identification.

CO3 Define and articulate SMART objectives for the project.

CO4 Select and justify appropriate research methodology and data collection techniques.

CO5 Analyze data accurately and interpret results to draw meaningful conclusions.

CO-PO & PSOs Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	3	-	-	-
CO3	-	2	1	-	-	-	3	1	2
CO4	-	3	-	3	2	-	-	-	-
CO5	-	-	-	-	-	1	1	-	-

Important points to consider to select the fellowship project.

Selecting the right fellowship project is crucial for maximizing the educational and professional benefits of a Diploma in Engineering program.

- **Relevance to Future Plans**: Choose a project that aligns with your long-term career aspirations and interests. This alignment will ensure that the skills and knowledge you gain will be directly applicable to your desired career path.
- **Industry Relevance**: Consider the current and future relevance of the project within the industry. Opt for projects that address contemporary challenges or emerging trends in engineering.
- **Access to Facilities**: Ensure that the necessary facilities, equipment, and materials are available to successfully complete the project. Lack of resources can hinder the progress and quality of your work.
- **Mentorship and Guidance**: Select a project that offers strong mentorship and support from experienced faculty members or industry professionals. Effective guidance is crucial for navigating complex problems and achieving project objectives.
- **Project Scope**: Assess the scope of the project to ensure it is neither too broad nor too narrow. A well-defined project scope helps in setting clear objectives and achievable milestones.
- **Feasibility**: Evaluate the feasibility of completing the project within the given timeframe and with the available resources. Consider potential challenges and ensure you have a realistic plan to address them.
- **Technical Skills**: Choose a project that allows you to develop and enhance important technical skills relevant to your field of study. Practical experience in using specific tools, technologies, or methodologies can be highly beneficial.
- **Soft Skills**: Consider projects that also offer opportunities to develop soft skills such as teamwork, communication, problem-solving, and project management.
- **Innovative Thinking**: Select a project that encourages creativity and innovative problem-solving. Projects that push the boundaries of traditional engineering approaches can be particularly rewarding.
- **Societal Impact**: Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.

Guidelines to select Fellowship

- Ensure the program is accredited by a recognized accrediting body and has a strong reputation for quality education in engineering.
- Ensure it covers core engineering principles that align with your interests and career goals.
- Investigate the qualifications and experience of the faculty mentor. Look for programs with faculty who have strong academic backgrounds, industry experience, and active involvement in research.
- Check if the program provides adequate hands-on training opportunities, such as laboratory work, workshops, and access to modern engineering facilities and equipment.
- Assess the program's connections with industry. Strong partnerships with companies can lead to valuable internship opportunities, industry projects, and exposure to real-world engineering challenges.
- Explore the availability of research opportunities. Participation in research projects can enhance your learning experience and open doors to innovative career paths.
- Look for programs that offer professional development resources, such as workshops, seminars, and networking events with industry professionals and alumni.
- Ensure the program provides robust support services, including academic advising, career counseling, mentorship programs, and assistance with job placement after graduation.
- Consider the cost of the program and available financial aid options, such as scholarships, grants, and fellowships. Evaluate the return on investment in terms of career prospects and potential earnings.
- Research the success of the program's alumni. High employment rates and successful careers of past graduates can indicate the program's effectiveness in preparing students for the engineering field.

Duties Responsibilities of the Faculty Mentor

Each student should have a faculty mentor for the Institute.

- Get the approval from the Chairman Board of Examinations with the recommendations of the HOD/Principal for the topics.
- Provide comprehensive academic advising to help fellows select appropriate specializations, and research projects that align with their interests and career goals.

- Guide fellows through their research projects, offering expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist fellows in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.
- Offer career advice and support, helping fellows explore potential career paths, prepare for job searches, and connect with industry professionals and opportunities.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between fellows and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure fellows have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of fellows, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Instill and uphold high ethical and professional standards, encouraging fellows to practice integrity and responsibility in their work.
- Assist with administrative tasks related to the fellowship program, such as preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development of fellows.
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

Instructions to the Fellowship Scholar

- Regularly meet with your faculty mentor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your mentor.
- Develop strong organizational skills. Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in research projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.

- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.
- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.
- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

Documents to be submitted by the student to offer fellowship.

- **Completed Application Form**: This is typically the standard form provided by the institution or fellowship program that includes personal information, educational background, and other relevant details.
- **Detailed CV/Resume**: A comprehensive document outlining your educational background, knowledge experience, interest in research experience, publications, presentations, awards, and other relevant achievements if any.
- **Personal Statement**: A document explaining your motivation for applying to the fellowship, your career goals, how the fellowship aligns with those goals, and what you intend to achieve through the program.
- **Recommendation Letters**: Letters from faculty mentor, employer, or professionals who can attest to your academic abilities, professional skills, and suitability for the fellowship.
- **Proposal/Description**: A detailed proposal or description of the fellowship project or study you plan to undertake during the fellowship. This should include objectives, methodology, expected outcomes, and significance of the project.
- **Enrollment Verification**: Documentation verifying your current acceptance status in the academic institution or industry where the fellowship will be conducted.

- **Funding Information**: Details about any other sources of funding or financial aid you are receiving, if applicable. Some fellowships may also require a budget proposal for the intended use of the fellowship funds.
- **Samples of Work**: Copies of the relevant work that demonstrates your capabilities and accomplishments in your field.
- **Endorsement Letter**: A letter from your current academic institution endorsing your application for the fellowship, if required.
- **Ethical Approval Documents**: If your research involves human subjects or animals, you may need to submit proof of ethical approval from the relevant ethics committee.
- **Additional Documents**: Any other documents requested by the fellowship program required by the institution.

Attendance Certification

Every month students have to get their attendance certified by the supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the faculty mentor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

Rubrics for Fellowship.

Sl. No.	Topics	Description
1	Alignment with Objectives	Assess how well the project aligns with the stated objectives and requirements. Determine if the student has addressed the key aspects outlined in the project guidelines.
2	Depth of Research:	Evaluate the depth and thoroughness of the literature review. Assess the student's ability to identify and address gaps in existing research.
3	Clarity of Objectives:	Check if the student has clearly defined and articulated the objectives of the project. Ensure that the objectives are specific, measurable, achievable, relevant, and time-bound (SMART).

4	Methodology and Data Collection:	Evaluate the appropriateness and justification of the research methodology. Assess the methods used for data collection and their relevance to the research questions.
5	Analysis and Interpretation:	Examine the quality of data analysis techniques used. Assess the student's ability to interpret results and draw meaningful conclusions.
6	Project Management:	Evaluate the project management aspects, including adherence to timelines and milestones.Assess the student's ability to plan and execute the project effectively.
7	Documentation and Reporting:	Check the quality of documentation, including code, experimental details, and any other relevant materials. Evaluate the clarity, structure, and coherence of the final report.
8	Originality and Creativity:	Assess the level of originality and creativity demonstrated in the project. Determine if the student has brought a unique perspective or solution to the research problem.
9	Critical Thinking:	Evaluate the student's critical thinking skills in analyzing information and forming conclusions. Assess the ability to evaluate alternative solutions and make informed decisions.
10	Problem-Solving Skills:	Evaluate the student's ability to identify and solve problems encountered during the project. Assess adaptability and resilience in the face of challenges.

DEPARTMENT OF CIVIL ENGINEERING - EQUIVALENCY				
Semesters Details	G - SCHEME		H - SCHEME	
	Course Title	Subject Code	Course Title	Subject Code
III SEM	Engineering Mechanics	CEG301	Mechanics of Materials	CEH301
	_	CEG302	Construction Materials	CEH302
	Surveying	CEG303	Surveying Practice	CEH373
	Civil Engineering Drawing - I	CEG304	_	_
	Surveying Practice –I	CEG375	Surveying Practice	CEH373
	Material Testing Laboratory– I	CEG376	Material Testing Lab	CEH376
	CAD in Civil Engineering Drawing Practice – I	CEG377	Building Planning and Drawing	CEH374
IV SEM	Theory of Structures	CEG401	Mechanics of Structures	CEH401
	Environmental Engineering and Pollution Control	CEG402	Environmental Engineering	CEH579
	Transportation Engineering	CEG403	Transportation Engineering	CEH402
	Civil Engineering Drawing - II	CEG404	_	_
	Surveying Practice –II	CEG475	Surveying Practice	CEH373
	Material Testing Laboratory–II	CEG476	Material Testing Lab	CEH376

	CAD in Civil Engineering Drawing Practical – II	**CEG477**	**Building Planning and Drawing**	**CEH374**
	–	**–**	**Mechanical, Electrical, and Plumbing Services**	**CEH582**
	–	**–**	**Defects in Building and Remedies**	**CEH584**
V SEM	**Design of RCC Structures**	**CEG501**	**Design of RCC Structures (Limit State Method)**	**CEH501**
	Estimation, Costing and Valuation	**CEG502**	**Estimation and Costing**	**CEH476**
	Town Planning	**CEG581**	**Urban Planning and Development**	**CEH585**
	Remote Sensing and Geoinformatics	**CEG582**	**Remote Sensing and Geoinformatics**	**CEH684**
	Geotechnical Engineering	**CEG583**	**Soil Mechanics and Foundation Engineering**	**CEH473**
	Environmental Engineering Laboratory	**CEG573**	**Environmental Engineering**	**CEH579**
	Computer Applications in Civil Engineering Practice	**CEG574**	**Computer Applications in Civil Engineering.**	**CEH577**
	–	**–**	**Mechanical, Electrical, and Plumbing Services**	**CEH582**

	–	–	**Building Bye Laws and Statutory drawings**	**CEH586**
	–	–	**Innovation and Startup**	**CEH57A**
	Advanced Surveying and Basic GIS Practical	**CEG584**	**Advanced Surveying**	**CEH688**
	Concrete Technology Practical	**CEG585**	**Concrete Technology**	**CEH474**
	Geotechnical Engineering Laboratory	**CEG586**	**Soil Mechanics and Foundation Engineering**	**CEH473**
	Entrepreneurship and Startups	**CEG575**	**Entrepreneurship**	**CEH682**
VI SEM	**Construction Management With MIS**	**CEG601**	**Construction Management and Safety Practice**	**CEH578**
	Hydraulics	**CEG602**	**Hydraulics**	**CEH375**
	Sustainable and Green Building Technology	**CEG603**	–	–
	–	–	**Advanced Environmental Engineering**	**CEH685**
	–	–	**Artificial Intelligence and Machine Language in Construction Management**	**CEH679**

	Advanced Concrete Technology	**CEG681**	**Advanced Concrete Technology**	**CEH686**
	Design of Steel Structures	**CEG682**	**Design and Drawing of Steel Elements**	**CEH67B**
	Water Resources Engineering	**CEG683**	**Irrigation and water resource engineering**	**CEH583**
	Hydraulics Laboratory	**CEG673**	**Hydraulics**	**CEH375**
	–	–	**Structural Detailing for RCC elements**	**CEH67A**
	Construction Practice Laboratory	**CEG684**	**Construction Practices**	**CEH475**
	Highway Engineering Laboratory	**CEG685**	**Advanced Transportation Engineering**	**CEH687**
	Estimation and Costing Laboratory	**CEG686**	**Estimation and Costing**	**CEH476**
	Project Work and Internship	**CEG674**	**In-house Project**	**CEH67C**
			Internship	**CEH67D**
	_	_	**Project Management**	**CEH683**
	_	_	**Advanced Engineering Mathematics**	**CEH681**
	_	_	**Fellowship**	**CEH67E**

DR.DHARMAMBAL GOVERNMENT POLYTECNIC COLLEGE FOR WOMEN, THARAMANI, CHENNAI-113					
DEPARTMENT OF CIVIL ENGINEERING					
CURRICULAM REVISED					
THIRD SEMESTER					
S.NO	**H SCHEME**	**DOTE SYLLABUS**	**G SCHEME**	**ADDITION**	**DELETION**
1	Mechanics of Materials	Mechanics of Materials	ENGINEERING MECHANICS		UNIT 1 Actions and reactions, Statics, Static equilibrium of bodies, Mechanics, Engineering Mechanics - Conditions of static equilibrium ,Study of strength of material, problems in change in dimensions and volume, Behaviour of ductile and brittle materials under direct loads - Load Extension curve (or) Stress Strain curve of a ductile material - Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Actual/Nominal stresses-Working stress- Factor of safety - Percentage elongation – Percentage reduction in area -Significanceof percentage elongation and reduction in area of cross section - Deformation of prismatic and stepped bars due to uniaxial load - Deformation of prismatic bars due to its self weight - Numerical problems. UNIT 3 Centroid of Asymmetrical shapes (triangular, semi circular, quadrant, trapezoidal, parabolic sections) - Centroid of Anti Symmetric shapes (S, Z sections) – Built up structural sections ,derivation of expressions for M.I / Polar M I, Section modulus and Radius of gyration of regular geometrical plane sections (rectangle and circle only) – M.I about centroidal axis / base, Section modulus, Radius of gyration of anti symmetric and built up symmetrical sections UNIT 4 Definitions of: Shaft, Couple, Torque (or) Twisting moment - Types of Shafts (one end fixed and the other rotating, both ends rotating at different speeds) - Theory of Pure Torsion – Assumptions -Derivation of Torsion equation, T / Ip = Ƭmax / R = Gϴ / l - Shear stress distribution in circular section due to torsion - Strength and Stiffness of shafts – Torsional rigidity - Torsional

2	Construction Material	Construction Material	construction Material and construction practice	**Unit I Construction Materials and Properties 1.1 Introduction** History of building materials- Conventional building materials- New and advanced materials -Eco friendly and green construction materials(Definition and any five materials)- Energy efficient and sustainable building materials(Definition and any five materials). **1.2 Properties of construction Materials** Thermal expansion-sustainability to freezing and thawing -Factors affectingdurability of building materials. **1.3.Aggregates** Classification of aggregates - Natural aggregates -Artificial aggregates - Light weight aggregates-Heavy weight aggregates-Recycling of aggregates. **1.4.Water** Requirements of water used in construction works Effects of	From **CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE UNIT – I CONSTRUCTION MATERIALS 1.2 ROCKS AND STONES** Rocks - Classification of Rocks - Geological, Physical and Chemical classification - Uses of stones - Requirements of a good building stone - Natural and Artificial stones for flooring - Examples (Detailed description not required). **1.3 BRICKS** Manufacturing process - properties of bricks- Tests on bricks(Names only) - requirements of bricks as per BIS. **1.4 LIME AND POZZOLANAS** Pozzolanic materials - Surki, Flyash, Ground blast furnace slag, Rice husk ash - Advantages of adding pozzolanas to cement. **1.5 CEMENT** Functions of cement ingredients -Different types of cements Storage of cement - Tests on cement (Names only) - objects of each test - Test requirements/ BIS specifications of OPC– Admixtures - Definition, types and uses. **1.6 GLASS** Functions and Utility - Types of glass, sizes used in buildings. **UNIT – II** **2.1 MORTAR** Properties and uses of mortar - M sand for mortar Types of mortar - Cement and Lime mortar **2.2 CONCRETE** Constituents of concrete and their requirements uses of concrete - Types of oncrete: Lime concrete, cement concrete - Definitions only. **2.3 PAINTS AND VARNISHES** Functions of paint and their uses - Characteristics of a good varnish -Types of varnish and their uses Oil, Turpentine,Spirit and water varnish. **2.4 METALS AND PLASTICS** Cast Iron - steel for pre stressed concrete- Uses of plastics -Types - Thermoplastics and Thermosetting plastics - Various plastic products:, taps, tubs, basins, partitions sizes, capacity and uses - Advantages and disadvantages of plastic products- Asbestos

				Unit III Cementitious materials **3.1 Cement** Portland Pozzolanic cement t-Water cement ratio-Hydration of cement- Setting of cement-Formation of Bogus compounds **3.2 supplementary cementitious materials** Pozzolanic materials-Fly ash-Types Ground Granulated blast furnace slag- Silica fume- Natural Pozzolans. **3.3 Lime** Slaking of lime-Lime Mortar -Lime putty-Uses **3.4. Bituminous materials** Introduction-Bitumen-Tar-Asphalt-applications. **Unit IV Timber, mortar, Concrete, Protective materials and Coatings** **4.1.Timber and wooden products** Methods of seasoning -Preservation of Timber **4.2 Mortar** Characteristics of good mortar - Grouting-Guniting. **4.3 Concrete** Production- Mix ratios-Mixing	**UNIT – III CONSTRUCTION PRACTICE** **3.1 INTRODUCTION TO STRUCTURES** Permanent and temporary structures - Life of structures - Sub structure - super structure - load bearing structure - framed structure - concept of framed structure - advantages of framed structure. **3.2 FOUNDATION** Definition - objectives of foundation - Bearing capacity of soil – Definition - maximum/ultimate and safe bearing capacity - Bearing capacity of different types of soils - Requirements of a good foundation - Types of foundations - Shallow foundation: Spread foundation, Isolated column footing, combined footing, continuous footing, Raft foundation - Deep foundation: Pile, Stone columns Types of piles : Bearing pile, Friction pile, under reamed pile - Causes of failure of foundation - Remedial measures. **3.3 STONE MASONRY** Definition - Common terms used : Natural bed, sill, corbel, course, cornice, coping, weathering, throat, spalls, quoins, string course, lacing course, through stone, plinth, jambs Classification of stone masonry - Rubble masonry : Coursed, un coursed & Random rubble masonry - Ashlar masonry - points to be considered in the construction of stone masonry - Tools used(Names only). **3.4 BRICK MASONRY** Definition - Common terms used - Header, stretcher, bed joint, lap, perpend, closer, king, queen & bevelled, bat permissible loads in brick masonry - Bond - Types Header, stretcher, English bond & Flemish bond one brick thick and one and a half brick thick - „T" junction in English bond - Points to be considered in the construction of brick masonry - Cavity bond masonry - Defects in brick masonry - Maintenance of brick masonry - Reinforced brick masonry - purpose - Its Advantage with respect to strength and Earthquake resistance

					UNIT – IV **4.1 DOORS, WINDOWS AND VENTILATORS** Standard sizes of doors and windows - Location of doors andwindows - Different materials used - Doors Component parts Types - Framed and panelled, glazed, flush, louvered, collapsible, rolling shutter and sliding doors - Windows Types - Casement, Glazed, Bay, Corner, Pivoted, Circular and Dormer windows- Ventilators – Definition, purpose,Types - Ventilator combined with windows / doors. **4.2 HOLLOW BLOCK CONSTRUCTIONS** Hollow blocks - Advantages of hollow blocks - load bearing and non load bearing hollow blocks - Open cavity blocks - face shells, web, gross area, nominal dimensions of blocks, minimum thickness of face shells and web, grades of hollow concrete blocks- Materials used, admixtures added - mixing, moulding, placingand compacting, curing, drying **4.3 STAIRS** Definition - Terms used - Location of stair types - Straight, Dog legged, Open well, bifurcated and spiral stairs - Moving stairs (Escalators) - Lift components uses and advantage of lifts over stairs. **4.4 FLOORS AND FLOORING** Floors - Definition – Types – Timber, Composite, RCC floors – Flooring - DefinitionMaterials used – Selection of flooring – types – Construction Methods (As per C.P.W.D / P.W.D Specifications) - Mosaic, Granolithic, Tiled, Granite, Marble, Pre cast concrete flooring, Plastic & PVC tile flooring- – Carpet tile & Rubber flooring. **4.5 ROOFS** Definition –Types of roof – Flat roof – RCC roof – Pitched roof – Tile roof – Shell roof – Technical terms - Steel roof truss – Types: King post, Raised chord, Howe truss, Fan, fink

3	Hydraulics	Hydraulics	Hydraulics and hydraulic laboratory	UNIT 1. Practical exercises: 1. Study of Manometers and Pressure Gauges. (Not for Exam) 2. Verification of Bernoulli's Theorem. 3. Flow through Venturimeter - Determination ofCo-efficient of Discharge. 4. Flow through Orificemeter – Determination of Co-efficient of Discharge. UNIT 2.Practical exercises 5. Flow through orifice - Determination of Co-efficient of Discharge by Time fall-Head method. 6. Flow through orifice - Determination of Co-efficient of Discharge by Constant head method. 7. Flow through external cylindrical mouth piece - Determination of Coefficient of Discharge by Timing fall in head	UNIT1.Dimensions and Units for area, volume, specific volume, velocity, acceleration, density, discharge, force, pressure and power. Pressure of liquid at a point – Intensity of pressure - Pressure head of liquid – Conversion from intensity of pressure to pressure head and vice-versa - Formula and Simple problems Micrometer - Problems.Pressure on plane surfaces - Horizontal, vertical and inclined surfaces- Total pressure-Centre of pressure - Depth of centre of pressure - Resultant pressure – Problems on Practical application - Sluice gates, Lock gates and Dams- Descriptions. UNIT 2. Equation for continuity of flow (law of conservation of mass) ,Problems on Practical applications of Bernoulli‟s theorem,Simple problems.,Transmission of power through pipes – Efficiency - Discharge formula - Simple problems in discharge ,loss in flowing fluid UNIT 3.Derivation of equations for discharges - Simple problems ,Discharge over a rectangular weir and trapezoidal weir – Derivation – Simple problems – End contractions of a weir – Franci‟s and Bazin‟s formula – Simple problems - Cippoletti weir – Problems - Narrow crested weir – Sharp crested weir with free over fall - Broad crested weir - Drowned or Submerged weirs - Suppressed weir - Stepped weir – Problems - Definition of terms - Crest of sill, Nappe or Vein, Free discharge - Velocity of approach – Spillways. UNIT 4.Definition - Classification - Rectangular and Trapezoidal channels – Discharge – Chezy‟s formula, Bazin‟s formula and Manning‟s formula - Hydraulic mean depth – Problems - Conditions of

4	BUILDING PLANNING AND DRAWING	BUILDING PLANNING AND DRAWING	CIVIL ENGINEERING DRAWING-1/CIVIL ENGINEERING DRAWING-II/CAD in Civil Engineering Drawing practice - I and CAD IN CIVIL ENGINEERING DRAWING PRACTICE -II	Basic principle of building drawing,Conventional signs for materials like bricks, stone, concrete, wood, glass, earth, steel - water supply and sanitary fixtures like tap, wash basin, sink, W.C pan (Indian and European type), shower, flush tank.-Electrical installations like one way switch, Two way switch, Distribution Board, Socket, Ceiling fan, LCD bulb, Fluorescent Lamp, Bell-Doors-Windows-Furniture's-Structural Elements like steel bars, stirrups 1.Sketch the Conventional signs for different construction materials 2.Sketch the Conventional signs for different water supply and sanitary fixtures 3.Draw the Conventional signs for Door, window and furniture items 4 Preparation of approval drawing	unit 1 Objects of bye-laws- Importance of bye-laws- Function of local authority- Set-backs- Plot Coverage- Number of floors- Height of building- Built upArea- Floor space index (FSI) - Views and details necessary for thepreparation of a civil engineering drawing- Site Plan – Necessity forApproval of plans from local body- Layout plan and key plan-Requirements for submission of drawing for approval- Rules and bye-laws of sanctioning authorities for construction work. unit 3 Draw the elevation of: 1. Fully panelled double leaf door. 2. Fully Panelled single leaf door 3. Flush door 4. Fully Panelled window with grill 5. Partly glazed and partly panelled window 6. Lean- to – roof 7. Rain water Harvesting– Recharging into the ground a. Shallow well system b. Percolation pit system. 8. Prepare the Water supply layout and sanitary layout. unit 4 1.A Reading room with R.C.C flat roof 2. A Two roomed house with RCC slope roof with gable ends 3 A small Restaurant building with R.C.C flat roof 3.A Bank building with R.C.C flat roof. 4 A House with fully tiled roof with hips and valleys

5	BUILDING PLANNING AND DRAWING	MATERIAL TESTING LAB	MATERIAL TESTING LABORATORY-I AND MATERIAL TESTING LABORATORY - II	Practical Exercises. 1. determining yield strength and finding important parameters. 2. Conducting compression test and determining direct compressive strength on i) Masonry block (ii)Paver blocks 3. Conducting deflection test on simply supported beams and finding its young's modulus value on (i)Wooden and (ii)Steel 4. Conducting fineness test on cement by Sieve analysis (OR) Blain's Air permeability apparatus. 5. Conduct Water absorption test on (i)Brick/Fly ash brick (ii) Coarse aggregates. 8. Conducting abrasion test on aggregate by Dorry's method. 11.Determination of Elongation Index, Flakiness index and angularity index of aggregates. THEORY	Practical Exercises. 1. Determination of Voids ratio and porosity of sand. 2. Determination of liquid limit and plastic limit of the given soil 3.Proctor's compaction test on soil. 4. Direct shear test on sand. 5. Field Density of Soil by core cutter method / sand replacement method. PART B 8. Compression Test on Wooden cube. 9. Compression test on Bricks. 10. Compression test on Solid Blocks 11. Water absorption test on Bricks /pressed tiles. 12. Casting of Cement Mortar cubes after determining the normal consistency of cement. 13. Determining the compressive strength of Cement Mortarcubes.

6	SURVEYING PRACTICE	SURVEYING PRACTICE	Combind SURVEYING & SURVEYING PRACTICE-I, ADVANCED SURVEYING AND BASIC GIS PRACTICAL	**UNIT 1:**Surveying Units and its conversion.	**Unit 1 Chapter 1.2** Introduction - Instruments used for chaining- Chains and Tapes – Types - Definitions of terms commonly used in chain surveying -.Definition, types, Instruments used - Errors in Chaining, Tape corrections and its necessity.
				UNIT 1:Exercises:1)Study of FMB sketch/Land documents and instruments used for chain surveying. (Not for examination)	**Unit 1 Chapter 1.3** Angular measurements-Necessity Instruments used-Problems-Errors in compass surveying
				UNIT 1:Exercises:2) Determine the distance between two ground stations with the help of a chain. (Direct ranging)	**Unit 2** Levelling - Definition - Level Parts, Functions, Accessories- Types of levels : Dumpy level, Quick setting level, Automatic and Laser level -Levelling staff - Types Component parts of Levelling instrument - Definitions of terms used : Level surface, Horizontal and Vertical surfaces, Datum, Bench marks, Reduced level, Rise, Fall, Line of collimation, Axis of telescope, Axis of bubble tube, Station,Focusingand Parallax.Principle of leveling - Simple leveling Comparison of methods - Missing entry calculations : Problems
				UNIT 1:Exercises:3)Calculate the area bounded by the given points by chain triangulation.	**Unit 3** Measurement of vertical angle and deflection angle - Reading bearing of a line-Theodolite traversing - Methods - Field checks in closed traverse-Problems on computation of area of closed traverse - Omitted measurements- Problems.
				Unit 1 Exercises:7) Conduct a block contouring survey in the given irregular field and plot the	**Unit 4 Chapter 4.2** Contouring – Methods of contouring – Direct and Indirect methods – Tacheometric contouring-Differentmethods-Calculation of capacity of reservoir : Simple problems.
				Unit 3 Chapter 3.2 Trigonometrical Levelling-Definition - Uses - Finding elevation of objects - Base accessible - Base inaccessible - Single plane method (No derivation) - Double plane method	
				Unit 4 Chapter 4.1 Tacheometry-Instrument used – System of Tacheometry - stadia and tangential - Fixed hair method and movable hair method - Tacheometric Constants - Anallactic lens (No Proof) – Uses - Distance and elevation formulae for horizontal and inclined line of sight (No derivation) - Uses of tacheometry. **Unit 4 Chapter 4.2**.Areas and volumes-Methods of determining areas and volumes - Mid ordinate	

				Unit 4 Exercises:14) Calculate the area of the given irregular field by using the Trapezoidal rule	
				Unit 4 Exercises:15)Calculate the area of a given irregular field by using Simpson's rule.	**Unit 5 Chapter 5.3** REMOTE SENSING AND GIS-Remote sensing – Definition – Basic Process – Methods of remote sensing – Applications.Introduction – Geographical information – Development of GIS –Components of GIS – Steps in GIS mapping - Ordinary mapping to GIS – Comparison of GIS with CAD and other system – Fields of Applications : Natural resources, Agriculture,Soil, Water resources, Wasteland management and Social resources.
					ADVANCED SURVEYING AND BASIC GIS PRACTICAL **(Elective Practical I)** Introduction to Remote Sensing and GIS and creating a map using tools 2. Introduction to ARC GIS Desktop 3. Geo referencing an image using ARC GIS. 4. Creating and editing Shape files in ARC MAP. 5. Editing in ARC MAP. 6. Adding fields to a Shape file. 7. Querying the data. 8. Buffering and Clipping.

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S NO	**H SCHEME**	**DOTE 2023 SYLLABUS**	**G SCHEME**	**ADDITION**	**DELETION**
1	Mechanics of Structures	Mechanics of Structures	Theory of Structures	unit 5 Limitations of Euler's formula – Modes of failure of column-Buckling of column-Buckling loadcrushing load	unit 1 Statically determinate and indeterminate Structures- Stable and Unstable Structures- ExamplesDegree of Indeterminacy- Concept of Analysis of Indeterminate beams - Definition of Prop– Types of Props- Prop reaction from deflection consideration – Drawing SF and BM diagrams by area moment method for UDL throughout the span, central and non-central concentrated loads – Propped cantilever with overhang – Point of Contra flexure. unit 3 Application of M-D method to Continuous beams of two / three spans and to Propped cantilever (Maximum of three cycles of distribution sufficient) –Finding Support Reactions- Problems - Sketching SFD and BMD for two / three span beams. unit 4 Direct and Indirect stresses – Combination of stresses – Eccentric loads on Columns – Effects of Eccentric loads / Moments on Short columns – Combined direct and bending stresses – Maximum and Minimum stresses in Sections– Problems – Conditions for no tension –Limit of eccentricity – Middle third rule – Core or Kern for square, rectangular and circular sections – Chimneys subjected to uniform wind pressure –Combined stresses in Chimneys due to Self weight and Wind load- Chimneys of Hollow square and Hollow circular cross sections only – Problem. unit 5 Gravity Dams – Derivation of Expression for maximum and minimum stresses at Base – Stress distribution diagrams – Problems – Factors affecting Stability of masonry dams – Factor of safety- Problems on Stability of Dams– Minimum base width and maximum height

2	Soil mechanics and foundation engineering	Soil mechanics and foundation engineering	Geotechnical Engineering/ Geotechnical Engineering laboratory	Unit I SOIL PROPERTIES AND ITS CLASSIFICATION Introduction to Soil Mechanics-Origin of soil, Three phase diagram - Definitions-Cohesive soil, Cohesion less soil, Void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters (Only formula) - Simple problems- BIS soil classification. PERMEABILITY, TOTAL STRESS AND SHEAR STRENGTH OF SOIL Permeability -Definition, Factors affecting permeability, Determination of coefficient of permeability (Constant head and falling head method - Procedure only)-Darcy's law-Differentiate Darcy velocity and seepage velocity - Definition and Significance of total stress, effective stress, Pore water pressure, Capillary phenomena& quick sand	1.Identification of rocks from the given specimen. 2. Determine water content of given soil sample by oven drying method as per IS: 2720(Part-II). 3. Determine Shrinkage limit of given soil sample as per IS 2720 (Part- V). 98 4. Determine grain size distribution of given soil sample by mechanical sieve analysis asper IS 2720 (Part- IV). 5. Use different types of soil to identify and classify soil by conducting field testsThroughVisual inspection, Dry strength test, Dilatancy test and Toughness test. 6. Determine coefficient of permeability by constant head test as per IS 2720 (Part- XVII). 7. Determine coefficient of permeability by falling head test as per IS 2720 (Part- XVII).
3	CONCRETE TECNOLOGY	CONCRETE TECNOLOGY	Concrete technology practical	"Unit 3 Chapter 3.1 Grades of concrete Provisions of IS 456-Effect of Water Cement Ratio on Concrete- Duff Abram Water Cement(w/c) Ratio Law-Significance of w/c RatioSelection of w/c Ratio for Different Grades Chapter 3.2 Properties of Fresh Concrete Workability-Factors affecting Workability of Concrete-Workability Requirement for different types of Concrete Works-Segregation, Bleeding, honey combing and Preventive Measures Chapter 3.3 Properties of Hardened Concrete Strength, Durability, Impermeability of concrete Unit 5 Chapter 5.1 Manufacture of concrete Concreting Operations-Batching-Mixing-Transportation, Placing, Compaction, Finishing, Curing Unit 5 Chapter 5.3 Quality Control of	"Unit 5 Chapter 5.2 Joints, Repairs and Maintenance of Concrete Types of joints – construction joints – contraction joints – expansion joints – isolation joints – methods of repairing concrete works Practicals 1.Shape Test for coarse aggregate – Flakiness Index test. 2. Shape Test for coarse aggregate – Elongation Index test. 3. Shape Test for coarse aggregate – Angularity number test. 4.Study of workability of self compacting concrete."

4	CONSTRUCTION PRACTICE	CONSTRUCTION PRACTICE	COMBINED CONSTRUCTION MATERIAL AND CONSTRUCTION PRACTICES & CONSTRUCTION PRACTICE LABORATORY.	**UNIT-I** **Theory Portion / Introduction 1.3 Practical Exercises,** 1.Study of Safe bearing capacity of soil by standard penetration test (SPT). **UNIT-III Introduction, 3.3 BLOCK MASONRY CONSTRUCTIONS** Types of cement blocks-Consideration for use of hollow concrete blocksLaying of hollow blocks-Compound walls in Block work. **3.4 Practical Exercises** 1. Construct concrete block masonry wall of 1m height. 2.Apply two or more coats of Water proofing coats for sump / overhead tank wall on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/ rollers adopting safe practices. **UNIT-IV Theory Portion / Introduction 4.4 Practical Exercises** 1.Cutting, hooking, cranking of specimen reinforcement bar and arrangement of	**CONSTRUCTION MATERIAL AND CONSTRUCTION PRACTICES UNIT – I** **BUILDING MATERIALS** **1.1 INTRODUCTION** Physical properties of materials - Density, Bulk density, Specific gravity, porosity, waterabsorption, permeability, chemical resistance, fire resistance, weathering resistance, thermalconductivity, Durability. (Definitions only). **1.2 ROCKS ANDSTONES** Rocks - Classification of Rocks - Geological, Physical and Chemical classification - Uses ofstones Requirements of agood building stone - Natural and Artificial stones for flooring - Examples (Detailed description not required). **1.3 BRICKS** Definition - Brick earth - Composition of good brick earth - Manufacturing process - classification of bricks -properties of bricks - special types of bricks and their uses - compressive strength of bricks - Tests on bricks(Names only) - grades and corresponding requirements of bricks as per BIS. **1.4 LIME AND POZZOLANAS** Sources of lime - classification of lime - Fat, Hydraulic and Poor lime - uses of lime - Pozzolanic materials - Surki, Flyash, Ground blast furnace slag, Rice husk ash – Advantages of adding pozzolanas to cement. **1.5 CEMENT** Definition - Composition of ordinary Portland cement - Functions of cement ingredients -
					UNIT – II BUILDING MATERIALS (CONTD) **2.1 MORTAR** Definition - Properties and uses of mortar - M sand for mortar - Types of mortar - Cement and Lime mortar - Mix ratio of cementmortars for different works. **2.2 CONCRETE** Definition - Constituents of concrete and their requirements - uses of concrete - Types of concrete: Lime concrete, cement concrete and ready mixed concrete - Definitions only. **2.3 PAINTS AND VARNISHES** Definition - Functions of paint Types of paints and their uses - Oil, Enamel, Emulsion, Distemper, Cement, Aluminium, Bituminous and Plastic paints - Varnishes, Definition Characteristics of a good varnish -Types of varnish and their uses Oil, Turpentine, Spirit and water varnish. **2.4 METALS AND PLASTICS** Types of metals used in construction - Cast Iron, Steel, Aluminium, GI, Stainless steel - Market forms of steel for reinforced concrete - steel for pre stressed concrete - Plastics Characteristics and Uses of plastics -Types - Thermoplastics and Thermosetting plastics - Various plastic products: pipes, taps, tubs, basins, doors, windows, water tanks, partitions sizes, capacity and uses - Advantages and disadvantages of plastic products- Asbestos - uses of asbestos.

					UNIT – III FOUNDATIONS AND MASONRIES, 3.4 BRICK MASONRY, T-junction in English bond- Cavity bond masonry - Maintenance of brick masonry - Reinforced brick masonry - purpose - Its Advantage with respect to strength and Earthquake resistance. **3.5 PARTITION** Definition - Requirements of good partition wall - Types Brick, Concrete, glass, Aluminums frame with Glass sheet, timber, straw board, wood wool, Asbestos Cement board and plastic **3.6 WATER PROOFING AND DAMP PROOFING** Method of mixing - Bad effects of excessive Admixtures in RCC, **UNIT – IV DOORS, FLOORS, ROOFS, 4.1 DOORS, WINDOWS AND** VENTILATORS, Ventilator combined with windows / doors. **4.2 HOLLOW BLOCK CONSTRUCTIONS,** Hollow blocks - Advantages of hollow blocks - load bearing and non load bearing hollow blocks - Open cavity blocks - face shells, web, gross area, nominal dimensions of blocks, minimum thickness of face shells and web, grades of hollow concrete blocks- Materials used, admixtures added - mixing, moulding, placing and compacting, curing, drying. **4.3 STAIRS** Moving stairs (Escalators) - Lift components uses and advantage of lifts over stairs. **4.4 FLOORS AND FLOORING** Flooring - Definition-– types – Construction Methods (As per C.P.W.D /P.W.D Specifications) - Mosaic, Granolithic, Tiled, Granite, Marble, Pre cast concrete flooring,Plastic & PVC tile flooring- – Carpet tile & Rubber flooring. **4.6 WEATHERING COURSE** Materials Required- Brick Jelly Concrete preparatione- Preparation of mortar with Damp Proof materials for laying pressed clay tiles- Pointing and finishing of clay tiles - Use of Thermal Resistant Weathering Tiles. **UNIT – V POINTING.**
5	ESTIMATION AND COSTING	ESTIMATION AND COSTING	Estimation, costing and valuation / Estimation and costing lab	Practical exercises: 1. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by Plinth area method. 2. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by cubical content method. 3. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by Service Unit Method. 4. Prepare data for the given items of work with necessary sub data. 5. Prepare detailed Specification for Earthwork, Foundation concrete, R.C.C in Beam, R.C.C in Slab and Column.	**Unit 1 Chapter 1.4** SPECIFICATIONS: Detailed specifications for works such as, earthwork excavation, foundation concrete, Reinforcement cement concrete in column, beam and slab -Weathering course - Steps involved in writing standard specifications. **Unit 2 Chapter 2.3** RATE ANALYSIS Brick and stone masonry – Plain cement concrete in foundation – Cement concrete for flooring works - Weathering course – R.C.C worksfor slab, sunshade, beam and column – Partition wall – Form works forbeams and slabs – Road works, WBM and surface dressing – White washing and painting works – A.C. sheet roofing – Apron and revetmentworks in canals – Wall plastering – Ceiling plastering – Pointing – Plumbing and sanitary works in buildings. **Unit 3 Chapter 3.2** TAKING OFF QUANTITIES USING TRADE SYSTEM: Prepare detailed estimate using Trade system and Take off quantities for all items of works in the following types of buildings: i. A small residential building with two rooms with RCC roof. ii. Industrial buildings with AC/GI sheet roof with steel trusses

	TRANSPORTATION ENGINEERING	TRANSPORTATION ENGINEERING	TRANSPORTATION ENGINEERING AND URBAN PLANNING	**Unit 1 Chapter 1.1**Types of Pavements–Flexible and Rigid Pavements- Comparative study of Flexible and **Unit 1 Chapter 1.2** Rigid pavement-Widening of pavement on horizontal curves.	**Unit 1 Chapter 1.1** Nagpur Plan – Ribbon Development-Importance of roads in India- **Unit 1 Chapter 1.3** Significance – Soil mass as a three phase system – Grain size classification – Atterberg limits – Definition and description – I.S. Classification of soils – Compaction – Definition – Objects of Compaction –Standard Proctor Compaction test – Shear strength – Definition – Importance – Direct shear test- **Unit 1 Chapter 1.4** General – Types of road aggregates –Requirements of a good road aggregates- Tests for road aggregates – Abrasion test – Crushing test – Impact test – Shape test – Specific gravity test and Water absorption test – Functions of Bituminous materials – Test for bituminous materials – Ductility test – Flash and Fire point test – Penetration test – Softening point test
				Unit 2 Chapter 2.1 Principles for ideal highway alignment-Factors affecting highway alignmentExcavating Equipments-Tractor, Bulldozer, Grader, Scraper, Asphalt recycling equipment, Motor graders -Compaction Equipments.	**Unit 1 Chapter 1.5** Formation of Hill roads – Hair pin bends – Retaining and Breast walls
				Unit 4 Chapter 4.1 Engine Shed-TrianglesTurntable- Traverses-Scotch Block-Buffer stops- Fouling marks-	**Unit 2 Chapter 2.1** Hogged rails –Bending of rails-Purpose of railway station– Types of switches
				Unit 5 Chapter 5.1 Airport classification –airportplanning : objectives ,components, layout characteristics, -orientation of Runways and correction factors for runway as per ICAO stipulations, parkingwind rose diagram. **Chapter 5.2** Harbour, port, satellite port, docks, waves and tides-planning of harbours: requirements, classification, location-harbour layout and terminal facilities-coastal structures : piers, break waters, wharves, jetties, quays, spring fenders, dolphins and floating landing stage.	**Unit 2 Chapter 2.5** Based on function and location – Special signals – Control of movement of trains – Absolute block system Automatic signalling – Centralized traffic control system-Tappets and locks system.

6					**UNIT III URBAN PLANNING 3.1** TOWN PLANNING PRINCIPLES General – Objects of town planning – Principles of Town planning – Necessity of town planning – Origin of towns – Growth of towns – Stages in town development – Personality of town - Distribution of land – Forms of planning – Site for an ideal town – Requirements of new towns – Planning of a modern town – Powers required for enforcement of town planning scheme – Cost of town planning – Present position of town planning in India **3.2 ZONING** Meaning of the term – Uses of land, objects and Principles of Zoning – Advantages of zoning – Importance of Zoning – Aspects of Zoning – Transition Zone – Economy of zoning – Special Economic Zone (SEZ) – Zoning powers – Maps for Zoning. **3.3 HOUSING** General - Importance of housing - Demand for houses - Building site - Requirements of residential buildings -Classification of residential buildings - Design of residential areas - Rural Housing - Agencies for housing -Investment in housing - HUDCO – CIDCO - Housing problems in India. **3.4 SLUMS** General - Causes of slums - Characteristics of slums - Effects of slums - Slum clearance - Problems in removing slums - Improvement Works - Open plot scheme - Slum clearance and rehousing -
					UNIT IV URBAN PLANNING (Contd.) 4.1 PUBLIC BUILDINGS General – Suitable location of Public buildings – Classification – of Public Buildings – Principles of design of public buildings – Town Centres – Grouping of public buildings – Requirements of Public buildings – Green House – Civic aesthetics **4.2 MASTER PLAN** General – Objects – Necessity – Factors to be considered –Data to be collected – Drawings to be prepared – Features of master plan – Planning standards – Report – Stages of preparation – Method of Execution – Conclusion **4.3 RE-PLANNING EXISTING TOWNS** General – Objects of re-planning – Analyzing the defects of existing towns – Data to be collected – Difficulties in Master Planning existing Towns / Cities – Urban renewal projects – merging of suburban areas – Decentralization – Satellite towns – Smart cities – definition and features – Surface drains – Refuses of Towns – Refuse disposal methods- **4.4 URBAN ROADS** General – Objects – Requirements of good city road – Factors to be considered – Classification of urban roads – Types of street systems – Through and By-pass roads – Outer and inner ring roads – Expressways –

					UNIT V URBAN PLANNING (Contd.) **5.1 TRAFFIC MANAGEMENT** General – Object – Traffic Survey – Traffic congestion – Traffic control – Traffic diversion – Roadjunction – Parking – Traffic capacity of road – One way traffic – Road traffic problems – Use of Islands and Flyovers at crossings – Causes of road accidents – Traffic signal – Advantages and disadvantages of Automatic light signals – Road sign – Road marking – Name boards of streets – Direction boards – Street lighting in a town – Traffic problem of existing towns – Peculiarities of traffic **5.2 BUILDING BYE -LAWS** General - Objects of bye-laws - Importance of bye-laws - Function of local authority - Responsibility of owner -Applicability of bye-laws - Set backs to buildings – Necessity of setbacks - Light plane – Plot coverage - Floor space index- Maximum Height of buildings - Off-street parking – Fire protection - Minimum width of streets and plot sizes – Some other terms - Principles underlying

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DEPARTMENT OF CIVIL ENGINEERING					
CURRICULAM REVISED					
FIFTH SEMESTER					
SI.NO	**H SCHEME**	**DOTE 2023 SYLLABUS**	**G SCHEME**	**ADDITION**	**DELETION**
1	DESIGN OF RCC (LIMIT STATE METHID)	DESIGN OF RCC (LIMIT STATE METHID)	Design of RCC Structures		"Unit 1 Chapter 1.1 Behaviour of R.C members in bending-Modular ratio and Equivalent area of R.C.Sections – Different types of loads on structuresas per IS: 875-1987 - Different methods of design. Working Stress Method-Assumptions made in the W.S.M- Singly reinforced rectangular sections – Strain and stress distribution due to bending – Actual and Critical neutral axes – Under / Over reinforced sections- Balanced sections – Lever arm – Moment of resistance of singly reinforced rectangular sections (No problems). Stress Straincurves for concrete and steel – Stress block – Maximum strain in concrete Unit 2 Chapter 2.1 DESIGN OF T-BEAMS AND LINTELS FOR FLEXURE BY L.S.M Loads on Isolated Lintels over openings of masonry walls - Design B.M for isolated lintels carrying rectangular/triangular loads- Design of Lintel- Simple problems Chapter 2.2 DESIGN OF CONTINUOUS BEAMS FOR FLEXURE AND SHEAR BY L.S.M Limit state of collapse in shear – Design shear strength of concrete – Design shear strengths of vertical / inclined stirrups and bent up bars – Principle of shear design – Critical sections for shear- S.F Coefficients specified by IS: 456- 2000– Nominal shear stress –Minimum shear reinforcement- Design of vertical stirrups for rectangular beams using limit state method –Simple problems- Practice on use of Design Aids (Description only). Unit 3 Chapter 3.1 DESIGN OF ONE WAY SLABS BY L.S.M – Curtailment of tension reinforcement –Anchoring of reinforcement– Practice in

					Chapter 3.2 DESIGN OF TWO WAY SLABS BY L.S.M Restrained and Continuous slabs – Tension and Torsion reinforcement requirement– Design of twoway slabs using B.M. coefficients – Curtailment of reinforcement – Check for stiffness only UNIT IV Unit 4 Chapter 4.1 DESIGN OF COLUMNS BY L.S.M helical reinforcement – Practice on use of Design Aids (Description only). Chapter 4.2 DESIGN OF COLUMN FOOTINGS UNIT V Chapter 5.1 DESIGN OF TENSION AND COMPRESSION MEMBERS BY L.S.M General- Characteristic Actions, Partial Safety Factors for Loads, Design Actions- Ultimate Strength, Partial Safety Factors for Materials, Design Strengths of Materials - Rolled Steel Sections - Different forms of Tension members – Gross area, Net area and Net Effective sectional area of Tension members– Maximum permitted values of Effective Slenderness Ratio–Design Strength of single angle Tension members against Yielding of Gross section and Rupture of Critical section- Block Shear (Description only)-Design of ties using single angles and channel sections. Different forms of Compression members- Classification of Cross sections- Limiting Width to Thickness Ratio- Effective sectional area-End Conditions and Effective length of Compression members – Maximum permitted values of Slenderness ratio – Imperfection factor and Stress reduction factor– Design Strength of Compression members- Problems — Design of single angle and double angle Struts – Design of steel columns using rolled steel sections (Symmetrical sections only) without cover plates. (Lacing and battens not included). Chapter 5.2 DESIGN OF SIMPLE BEAMS AND WELDED CONNECTIONS BY L.S.M
		Elective -1			
2		MECHANICAL, ELECTRICAL, AND PUMBING SERVICES		New subject added to H scheme	

3	IRRIGATION AND WATER RESOURCE ENGINEERING	IRRIGATION AND WATER RESOURCE ENGINEERING	Water Resources Engineering	UNIT I IRRIGATION AND ITS METHODS Chapter 1.1 INTRODUCTION Definition of Irrigation – Water resources in India – Necessity - Benefits of Irrigation – Ill-effects of Irrigation – Types of Irrigation - Command area development - Impact of irrigation on environment Chapter 1.2 METHODS OF IRRIGATION Function of Irrigation water – Standards of Irrigation water - Methods of applying water to crops – Surface irrigation - Uncontrolled flooding – Free flooding – Contour Laterals – Border strip method – Check flooding – Basin flooding – Zig-Zag method – Furrow method –	"UNIT I Chapter 1.1 INTRODUCTION Water resources – world water inventory - Importance of water resources - Necessity for conservation and development of water resources – water resources of India - water resources management - purpose - factors involved in water resources management. UNIT II Chapter 2.1 GROUND WATER geo physical methods -Electrical resistivity method – seismic resistivity method- logs. Chapter 2.2 MANAGEMENT OF GROUND WATER Concept of basin management - Ground water basin investigations - data collection and field work - mining yield - perennial yield - salt balance - basin management by conjunctive use - artificial recharge of Ground water - recharge methods UNIT III Chapter 3.1 RIVERS AND RIVER TRAINING WORKS Classification of river - Major rivers in India and Tamil Nadu - Inter linking of rivers in India and its importance – flood - flood forecasting - flood control in India. River training - objectives of river training - classification of river training - methods of river training – levees - guide banks – spurs – types - artificial cut-offs – launching apron - pitching of banks - pitched islands - miscellaneous methods. Chapter 3.2 STORAGE WORKS Surface storage - purpose of surface storage – tanks – types - tank weirs – tank outlet – reservoirs – types
4		DEFECTS IN BUILDING AND REMEDIES		New subject added to H scheme	
5		URBAN PLANING AND DEVELOPMENT	URBAN PLANING AND DEVELOPMENT	**Unit 1** Types Of Urban Planning	**Unit 1** HIGHWAY ENGINEERING
				Unit 5 Chapter 5.2 SUSTAINABLE PLANNING Urban Development Missions in India - Sustainable Planning Techniques - Social Infrastructure - Green Buildings - Sustainable Building Planning	**Unit 2** RAILWAY ENGINEERING **Unit 3 Chapter 3.2** ZONING Meaning of the term – Uses of land, objects and Principles of Zoning – Advantages of zoning – Importance of Zoning – Aspects of Zoning – Transition Zone – Economy of zoning – Special Economic Zone (SEZ) – Zoning powers – Maps for Zoning. **Chapter 3.4** - Improvement Works - Open plot scheme - Slum clearance and rehousing **Unit 4 Chapter 4.1** PUBLIC BUILDINGS General – Suitable location of Public buildings – Classification of Public Buildings – Principles of design of public buildings – Town Centres
					Chapter 4.3 RE-PLANNING EXISTING TOWNS- Surface drains – Refuses of Towns – Refuse
					Unit 5 Chapter 5.1 TRAFFIC MANAGEMENT- Street lighting in a town – Traffic problem of existing towns – Peculiarities of traffic
					Chapter 5.2 BUILDING BYE -LAWS Off-street parking – Fire protection - Minimum width of streets and plot sizes – Some other terms - Principles underlying in framing building bye- laws – Building bye-laws for residential area of a typical town planning scheme – Building bye-laws for other types of buildings - **Chapter 5.3** MISCELLANEOUS TOPICS Airports – Location - size - Noise control - Parts of an airports - Betterment and compensation – City blocks –Conurbations - Cul-de-sac streets - Focal point - Green belt - Public utility services - Rapid transit –Remote sensing application – Urbanplanning

6		BUILDING BYE LAWS AND STATUTORY DRAWINGS		New subject added to H scheme	
7	COMPUTER APPLICATION IN CIVIL ENGINEERING	COMPUTER APPLICATION IN CIVIL ENGINEERING	COMPUTER APPLICATION IN CIVIL ENGINEERING PRACTICE	Computer Applications in Civil Engineering Part B ANALYSIS OF RCC STRUCTURES Note: Analyse the Structure using any one of the available Software PackagesStaadpro, ,SAP,etabs,Tekla,Cads3d etc.) 1.Carryout the analysis of Continuous Beam with given size 2.Carryout the analysis of Portal Frame structure with given size 3.Carryout the analysis of king post roof truss 4.Carry out the analysis and design of 1 BHK residential house with given structure Part C DRAFTING OF RCC STRUCTURES Note: Draw the Structure using any one of the available 3D drafting Software Packages – Autodesk Revit Architecture, ArchiCAD, Autodesk Civil3D Sketchup	COMPUTER APPLICATION IN CIVIL ENGINEERING PRACTICE PART - A I ELECTRONIC SPREAD SHEET USING SOFTWARE 1. Design and Analysis problems 2. For given dimension of Masonry/R.C.C Dam ie. top width, bottom width, height of Dam , height of water, Specific weight of masonry/R.C.C. , Sp.wt of Water etc,. Findthe base pressure and check the stability of the dam. PART B III. RCC DETAILING USING SOFTWARE Generation of detailed drawings for the given specification and Preparation of Bar Bending schedule using any one of the software packages for the following exercises. Cross section and longitudinal section of: 1. Continuous one way slab (with three equal spans) 2. Simply supported two-way slab 3. Restrained two - way slab 4. Singly reinforced rectangular beam 5. Doubly reinforced continuous rectangular beam with two equal span 6. Dog-legged staircase 7. R.C.C Column with square Isolated footing IV. CONSTRUCTION PROJECT MANAGEMENT USING SOFTWARE 1. Develop the CPM / PERT Network for the proposed simple building project using anyone of the available packages mentioned below or any other suitable packages. V DRAWING MAPS USING GIS SOFTWARE (Demonstration and Practice only) 1. Develop Aerial map of given area using any one of the available packages mentionedbelow or any other suitable packages

8		CONSTRUCTION MANAGEMENT AND SAFETY PRACTICES	Construction Management with MIS	**PRACTICAL EXERCISES** **1.**Problems to find EST, EFT, LST, LFT using MS Project and Excel. 2Preparation of Key Plan, Job Layout using BIM tool like Revit/Sketchup/AutoCAD. 3.Problems on PERT network – TE, TL and slack using MS Project and Excel. 4 Problems to find Standard deviation and Variance using MS Project and Excel. 5.Writing M- book using MS Excel 6. Prepare comparative statements in selecting tender using MS Excel. 7.Calculate man hours for construction activity and link with scheduling. 8.Site visit and prepare safety checklist for construction activity. 9.MS project – CPM 10.MS project – PERT Analysis	**UNIT I** **1.1 CONSTRUCTION SECTOR IN INDIA** Objectives and & functions-Public and Private functions of construction management in national development **1.2 FEASIBILITY STUDY** Study of necessity of project–Recovery from the project-–Building Economics –Preliminary studies-Analysis – valuation. **1.3 PLANNING OF CIVIL ENGINEERING PROJECT** Public Project - Preliminary planning – Designfactors – Site utilization– Reconnaissance survey – Preliminary survey – Analysis and plotting of data – Estimate :preliminary and detailed estimate – Project report – Land acquisition – Budget provision- Private project – Advantages of planning to client andengineer – limitations -Stages of planning byowner and contractor. **1.4 CONTRACT MANAGEMENT** Contractual obligations - Specifications -Tender documents- Contractual changes and termination of contract – Execution of agreement **UNIT II** **2.1 CONSTRUCTION ORGANISATIONS AND THEIR SUPERINTENDENCE** sole proprietorship – Partnership -Joint stock company,- Cooperative society,- and State enterprises-Advantages and Disadvantages -delegation of responsibility, personnel requirements and division of works – Construction supervision and Superintendence – Requirements and Responsibilities of Executives of the project – Qualities of Efficient construction Manager - Pay rolls and Records - Purchase and delivery of construction materials and equipments –- Insurance record - Project office requirement - Organisation chart of a small / medium / large construction company (broad outline only). **2.2 DEPARTMENTAL PROCEDURE AND ACCOUNTING** Responsibilities of officers- Accounting for consumable materials - Record for tools and plants –Work charged establishment **UNIT III**

9		ENVIRONMENTAL ENGINEERING	ENVIRONMENTAL Engineering and pollution control / Environment Engineering Laboratory		**Unit 1 Chapter 1.1** prediction of population - problems in arithmetical increase method, geometrical increase method, incremental increase methods **Unit II Chapter 2.1 –** filtration- theory of filtration - types and description of filters - disinfection of water – methods - water softening –miscellaneous water treatment(names only) - mineral water – requirements - R.O process. **Unit IV Chapter 4.1** filters - types and description of filters - activated sludge process - septic tanks for isolated buildings - construction and working of septic tanks - disposal of septic tank effluent – soak pits, dispersiontrenches - oxidation ponds – sludge – types - methods of sludge disposal. **Chapter 4.2** SOLID WASTE MANAGEMENT Solid waste – classification - collection and conveyance of solid waste - disposal of solid waste – necessity - reduction and reuse of solid wastes - methods of solid waste disposal - incineration, dumping, sanitary landfill , composting - energy from waste. **UNIT V** **Chapter 5.1** ENVIRONMENTAL POLLUTION Environment – definition - water pollution - sources of water pollution - effects of water pollution - control of water pollution - soil pollution - sources of soil pollution - effects of soil pollution - control of soil pollution - noise pollution - sources of noise pollution - effects of noise pollution - control of noise pollution - air pollution - sources of air pollution - effects of air pollution on human beings, plants, animals, materials - air pollution control equipment - control devices for particulate contaminants - environmental degradation - ozone layer depletion - green house effect - acid rain.
10		INNOVATION AND STARTUP	Entrepreneurship and Startups		

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SI.NO	**H SCHEME**	**DOTE 2023 SYLLABUS**	**G SCHEME**	**ADDITION**	**DELETION**
		ELECTIVES-2 (PATHWAY)			
	ADVANCED ENGINEERING MATHEMATICS	ADVANCED ENGINEERING MATHEMATICS		New subject added to H scheme	New subject deletion to H scheme
	FINANCE FUNDAMENTALS	FINANCE FUNDAMENTALS			
	ADVANCED ENVIRONMENTAL ENGINEERING	ADVANCED ENVIRONMENTAL ENGINEERING			

	ADVANCED CONCRETE TECNOLOGY	ADVANCED CONCRETE TECNOLOGY	ADVANCED CONCRETE TECNOLOGY	**UNIT I** CEMENT CHEMISTRY Chemical composition-Bogue's Compounds-Oxide composition &Compound Composition-Hydration of cement-Heat of hydration-Heat evolution pattern & peaksCalcium silicate hydrates-Calcium Hydroxide-Calcium Aluminate Hydrate-Interfacial Transition zone-Water requirement for hydration-Composition of cement paste at different stages of hydration. **Unit 2 Chapter 2.3** Fly ash-effect of fly ash on fresh concrete and hardened concrete, Ground granulated blast furnace slag (GGBS)- performance of GGBS in fresh and hardened concrete. Silica fumes- available formsinfluence on fresh and hardened concrete. **UNIT III** DURABILITY, PERMEABILITY AND CORROSION **Chapter 3.1** Durability and Permeability Durability-Definition and significance-Cracking-Types and causes of cracks in concrete-Factors contributing to cracks in concrete-Plastic shrinkage cracks-Bleeding Drying Shrinkage-Sulphate attack-Freezing and Thawing-Methods of controlling sulphate attack-Carbonation-Rate of carbonation-Alkali-silica reaction.	**Unit V Chapter 5.2** Joints, Repairs and Maintenance of Concrete Types of joints – construction joints – contraction joints – expansion joints – isolation joints – methods of repairing concrete works
7	ADVANCED TRANSPORTATION ENGINEERING	ADVANCED TRANSPORTATION ENGINEERING		New subject added to H scheme	
8	ADVANCED SURVEYING	ADVANCED SURVEYING		New subject added to H scheme	
	ELECTIVES-3 (SPECIALISATION)	ELECTIVES-3 (SPECIALISATION)			

	Artificial Intelligence and Machine Language in construction management	Artificial Intelligence and Machine Language in construction management		New subject added to H scheme
	Structural Detailing for RCC elements	Structural Detailing for RCC elements		New subject added to H scheme
	Design and Drawing of steel elements	Design and Drawing of steel elements		New subject added to H scheme

Integrated Learning Experiences (ILE)

Standard Operating Procedures(SOPs)

Introduction:

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. This new curriculum revamping (R2023) 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. From this perspective, a new structure called "Integrated Learning Experiences(ILE)" is introduced in the regulation 2023. This ILE encompass 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' program of study. It prioritizes the holistic development of students, fostering their growth and well-roundedness.

- - - - 23 - 886*		L	T	P	C**
AUDIT	**HEALTH & WELLNESS**	**0**	**0**	**2**	**1**

*(First four digits in the subject code is branch code and Seventh digit is Semester)

** Health & Wellness has one credit for the third semester only and it has no credits for other semesters.

Skill Areas:

Physical Fitness, Nutrition, Mental Health, Awareness on Drug addiction and its effects

Purpose:

The Health & Wellness course focuses on teaching the elements of physical, mental, emotional, social, intellectual, environmental well-being which are essential for overall development of an individual. The course also addresses the dangers of substance abuse and online risks to promote emotional and mental health.

Learning Outcomes:

Upon completion of the Health & Wellness course, students will be able to:

1. Demonstrate proficiency in sports training and physical fitness practices.
2. Improve their mental and emotional well-being, fostering a positive outlook on health and life.
3. Develop competence and commitment as professionals in the field of health and wellness.
4. Awareness on drug addiction and its ill effects

Focus:

During the conduct of the Health & Wellness course, the students will benefit from the following focus areas:

1. Stress Management.
2. Breaking Bad Habits.
3. Improving Interpersonal Relationships.
4. Building Physical Strength & Inner Strength.

Role of the Facilitator:

The faculty plays a crucial role in effectively engaging with students and guiding them towards achieving learning outcomes. Faculty participation involves the following areas:

1. **Mentorship & Motivation:** The Facilitator mentors students in wellness and self-discipline while inspiring a positive outlook on health. Faculty teach stress management, fitness, and daily well-being.
2. **Promoting a Safe and Inclusive Environment:** The facilitator ensures a safe, inclusive, and respectful learning environment for active student participation and benefit.
3. **Individualised Support and Monitoring Progress:** The facilitator plays a crucial role in providing personalized support, monitoring and guidance to students.

Guided Activities:

In this course, several general guided activities have been suggested to facilitate the achievement of desired learning outcomes. They are as follows:

1. Introduction to Holistic Well-being.
2. Holistic Wellness Program- Nurturing Body and Mind
3. Breaking Bad Habits Workshop.
4. Improving the elements of physical, emotional, social, intellectual, environmental and mental well-being.
5. Creating situational awareness, digital awareness.
6. Understanding substance abuse, consequences and the way out.

Period Distribution

The following are the guided activities suggested for this Audit course.

The Physical Director should plan the activities by the students.

Arrange the suitable Mentor / Guide for the wellness activities.

Additional activities and programs can be planned for Health and Wellness.

S.No	Guided Activities	Period
1	**Introduction to Holistic Well-being** 1. Introduce the core components of Health & Well-being namely Physical, mental and emotional well-being 2. Provide worksheets on all the four components individually and explain the interconnectedness to give an overall understanding.	
2	**Wellness Wheel Exercise (Overall Analysis)**	

	• Guide students to assess their well-being in various life dimensions through exercises on various aspects of well – being, and explain the benefits of applying wellness wheel. • Introduce Tech Tools: • Explore the use of technology to support well-being. • Introduce students to apps for meditation, sleep tracking, or healthy recipe inspiration.	
3	**Breaking Bad Habits (Overall Analysis)** • Open a discussion on bad habits and their harmful effects. • Provide a worksheet to the students to identify their personal bad habits. • Discuss the trigger, cause, consequence and solution with examples. • Guide them to replace the bad habits with good ones through worksheets.	
4	**Physical Well-being** **1. Fitness** Introduce the different types of fitness activities such as basic exercises, cardiovascular exercises, strength training exercises, flexibility exercises, so on and so forth. (Include theoretical explanations and outdoor activity). **2. Nutrition** Facilitate students to reflect on their eating habits, their body type, and to test their knowledge on nutrition, its sources and the benefits. **3. Yoga & Meditation** Discuss the benefits of Yoga and Meditation for one's overall health. Demonstrate different yoga postures and their benefits on the body through visuals (pictures or videos)	

	4. Brain Health Discuss the importance of brain health for daily life. Habits that affect brain health (irregular sleep, eating, screen time). Habits that help for healthy brains (reading, proper sleep, exercises). Benefits of breathing exercises and meditation for healthy lungs. **5. Healthy Lungs** Discuss the importance of lung health for daily life. Habits that affect lung health (smoking, lack of exercises). Benefits of breathing exercises for healthy lungs. **6. Hygiene and Grooming** Discuss the importance of hygienic habits for good oral, vision, hearing and skin health. Discuss the positive effects of grooming on one's confidence level and professional growth. **<u>Suggested Activities (sample):</u>** **Nutrition:** Invite a nutritionist to talk among the students on the importance of nutrition to the body or show similar videos shared by experts on social media. Organize a 'Stove less/fireless cooking competition' for students where they are expected to prepare a nutritious dish and explain the nutritive values in parallel.	
5	**Emotional Well-being** **1. Stress Management** Trigger a conversation or provide self-reflective worksheets to identify the stress factors in daily life and their impact on students' performance. Introduce different relaxation techniques like deep breathing, progressive muscle relaxation, or guided imagery. (use audio recordings or visuals to guide them through these techniques). After practicing the techniques, have them reflect on how these methods can help manage stress in daily life. **2. Importance of saying 'NO'.**	

	Explain the students that saying 'NO' is important for their Physical and mental well-being, Academic Performance, Growth and Future, Confidence, Self-respect, Strong and Healthy Relationships, building reputation for self and their family (avoid earning a bad name). Factors that prevent them from saying 'NO'. How to practice saying 'NO''. **3. Body Positivity and self-acceptance** Discuss the following with the students. ● What is body positivity and self-acceptance? ● Why is it important? ● Be kind to yourself. ● Understand that everyone's unique. **<u>Suggested Activities(Sample):</u>** (Importance of saying 'NO') Provide worksheets to self-reflect on… …how they feel when others say 'no' to them …the situations where they should say 'no' Challenge students to write a song or rap about the importance of saying no and how to do it effectively. Students can perform their creations for the class.	
6	**Social Well-Being** **1. Practicing Gratitude** Discuss the importance of practicing gratitude for building relationships with family, friends, relatives, mentors and colleagues. Discuss how one can show gratitude through words and deeds. Explain how practicing gratitude can create 'ripple effect'. **2. Cultivating Kindness and Compassion** Define and differentiate between kindness and compassion. Explore practices that cultivate these positive emotions. Self-Compassion as the Foundation.	

	The power of small gestures. Understanding another's perspective. The fruits of compassion. **3. Practising Forgiveness** Discuss the concept of forgiveness and its benefits. Forgiveness: What is it? and What it isn't? Benefits of forgiveness. Finding forgiveness practices. **4. Celebrating Differences** Appreciate the value of individual differences and foster inclusivity. The World: A Tapestry of Differences (cultures, backgrounds, beliefs, abilities, and appearances). Finding strength in differences (diverse perspectives and experiences lead to better problem-solving and innovation). Celebrating differences, not ignoring them (respecting and appreciating the unique qualities). Activities for celebrating differences (share culture, learn about others, embrace new experiences). **5. Digital Detox** **Introduce the students to:** The concept of a digital detox and its benefits for social well-being. How to disconnect from devices more often to strengthen real-world connections. **<u>Suggested Activities (sample)</u>**: (Practicing Gratitude) Provide worksheets to choose the right ways to express gratitude. Celebrate 'gratitude day' in the college and encourage the students to honour the house keeping staff in some way to express gratitude for their service.	
7.	**Intellectual Well-being** **1. Being a lifelong Learner** **Give students an understanding on:** The relevance of intellectual well-being in this 21st century to meet	

	the expectations in personal and professional well-being The Importance of enhancing problem-solving skills Cultivating habits to enhance the intellectual well-being (using the library extensively, participating in extra-curricular activities, reading newspaper etc.) **2. Digital Literacy** **Discuss:** The key aspects of digital literacy and its importance in today's world. It is more than just liking and sharing on social media. The four major components of digital literacy (critical thinking, communication, problem-solving, digital citizenship). Why is digital literacy important? Boosting one's digital skills. **3. Transfer of Learning** Connections between different subjects – How knowledge gained in one area can be applied to others. **Suggested Activities(sample):** Intellectual Well-being. Provide worksheets to students for teaching them how to boost intellectual well-being. Ask the students to identify a long-standing problem in their locality, and come up with a solution and present it in the classroom. Also organize an event like 'Idea Expo' to display the designs, ideas, and suggestions, to motivate the students to improve their intellectual well-being.	
8	**Environmental Well-being** 1.The Importance of initiating a change in the environment. **The session could be around:** Defining Environmental well-being (physical, chemical, biological, social, and psychosocial factors) – People's behaviour, crime, pollution, political activities, infra-structure, family situation etc. Suggesting different ways of initiating changes in the environment (taking responsibility, creating awareness, volunteering,	

	approaching administration). **<u>Suggested Activities (sample)</u>**: Providing worksheets to self-reflect on how the environment affects their life, and the ways to initiate a change. Dedicate a bulletin board or wall space (or chart work) in the classroom for students to share their ideas for improving environmental well-being. Creating a volunteers' club in the college and carrying out monthly activities like campus cleaning, awareness campaigns against noise pollution, (loud speakers in public places), addressing anti-social behaviour on the campus or in their locality.	
9	**Mental Well-being** **1. Importance of self-reflection** **Discuss:** Steps involved in achieving mental well-being (self-reflection, self-awareness, applying actions, achieving mental well-being). Different ways to achieve mental well-being (finding purpose, coping with stress, moral compass, connecting for a common cause). The role of journaling in mental well-being. **2. Mindfulness and Meditation Practices** Benefits of practicing mindful habits and meditation for overall well-being. **1. Connecting with nature** Practising to be in the present moment **–** Nature walk, feeling the sun, listening to the natural sounds. Exploring with intention – Hiking, gardening to observe the nature. Reflecting on the emotions, and feeling kindled by nature. **2. Serving people** Identifying the needs of others. Helping others. Volunteering your time, skills and listening ear. Finding joy in giving. **3. Creative Expressions**	

	Indulging in writing poems, stories, music making/listening, creating visual arts to connect with inner selves. **<u>Suggested Activities(Sample):</u>** (Mindfulness and Meditation) – Conducting guided meditation every day for 10 minutes and directing the students to record the changes they observe.	
10	**Situational Awareness (Developing Life skills)** **1. Being street smart** **Discuss:** Who are street smarts? Why is it important to be street smart? Characteristics of a street smart person: Importance of acquiring life skills to become street smart – (General First-aid procedure, CPR Procedure, Handling emergency situations like fire, flood etc). **2. Digital Awareness** **Discuss:** Cyber Security Information Literacy Digital Privacy Fraud Detection **<u>Suggested Activities</u>** (sample): (Street Smart) Inviting professionals to demonstrate the CPR Procedure Conducting a quiz on Emergency Numbers	
11	**Understanding Addiction** **Plan this session around:** Identifying the environmental cues, triggers that lead to picking up this habit. Knowing the impact of substance abuse – Adverse health conditions, social isolation, ruined future, hidden financial loss and damaging the family reputation. Seeking help to get out of this addiction. **<u>Suggested Activities</u>**:	

	Provide Worksheets to check the students' level of understanding about substance addiction and their impacts. Share case studies with students from real-life. Play/share awareness videos on addiction/de-addiction, experts talk. *Conduct awareness programmes on Drugs and its ill effects. (Arrange Experts from the concerned government departments and NGOs working in drug addiction issues) and maintain the documents of the program.	

Closure:

Each student should submit a Handwritten Summary of their Learnings & Action Plan for the future.

Assessments:

- Use Self-reflective worksheets to assess their understanding.
- Submit the worksheets to internal audit/external audit.
- Every student's activities report should be documented and the same have to be assessed by the Physical Director with the mentor. The evaluation should be for 100 marks. No examination is required.

Scheme of Evaluation

Part	Description	Marks
A	Report	40
B	Attendance	20
C	Activities (Observation During Practice)	40
Total		100

References/Resource Materials:

The course acknowledges that individual needs for references and resources may vary. However, here are some general reference materials and resources that may be helpful:

1. **The Well-Being Wheel:**

2. **Facilities & Spaces:** Some activities may require access to specific facilities, resources or spaces. Students may need to coordinate with the college administration to reserve these as required.
3. **Online Resources:**
    1. United Nations Sustainable Development Goals - Goal 3 - Good Health & Well-Being: https://www.un.org/sustainabledevelopment/health/
    2. Mindfulness and Meditation: Stanford Health Library offers mindfulness and meditation resources: https://healthlibrary.stanford.edu/books-resources/mindfulness-meditation.html

3. Breaking Bad Habits: James Clear provides a guide on how to build good habits and break bad ones: https://jamesclear.com/habits
4. 6 Ways to Keep Your Brain Sharp https://www.lorman.com/blog/post/how-to-keep-your-brain-sharp
5. What Is Social Wellbeing? 12+ Activities for Social Wellness https://positivepsychology.com/social-wellbeing/
6. How Does Your Environment Affect Your Mental Health? https://www.verywellmind.com/how-your-environment-affects-your-mental-health-5093687
7. How to say no to others (and why you shouldn't feel guilty) https://www.betterup.com/blog/how-to-say-no

- - - - 23 - 880*	**Growth Lab**
AUDIT	

*(First four digits in the subject code is branch code and Seventh digit is Semester)

Skill Areas:

Self-Discovery, Habit Formation, Mind-set Development.

Learning Outcomes:

The Growth Lab aims to provide students with various learning outcomes, including:

1. Develop personal ethics, a growth mind-set, and strong communication skills.
2. Practice effective time management, overcoming challenges, and teamwork.
3. Master academic skills like reading, writing, and goal setting.
4. Become job-ready through resume building, interviewing, and resource utilization.
5. Reflect on their growth journey and articulate its impact.

Focus:

While organizing and participating in the Growth Lab, students should focus on the following key areas:

1. **Mindful Habits:** Emphasize the importance of cultivating mindful habits in their daily lives. Encouraging students to be conscious of their actions, thoughts, and emotions can help them identify any negative patterns and replace them with positive and empowering habits.
2. **Self-reflection:** Students should engage in self-reflection to gain deeper insights into their own strengths, weaknesses, and areas for improvement. Taking the time to reflect on their experiences and learning helps in identifying personal growth opportunities.
3. **Goal Setting:** Students should set clear goals for their personal and professional development. Encourage students to set specific, measurable, achievable, relevant, and time-bound (SMART) goals.

Role of the Facilitator:

Department faculty shall play a crucial role in organizing the Growth Lab. Their responsibilities include:

1. **Facilitation:** Faculty lead and guide the students throughout the Growth Lab sessions. They provide instructions, facilitate discussions, and offer insights to foster a

stimulating learning environment. They ensure that the sessions are engaging, interactive, and conducive to student participation.

2. **Mentorship:** Facilitators should Provide clear explanations and guidance on the importance of cultivating mindful habits in their daily lives and engaging in self-reflection. Help students understand how these practices contribute to their personal growth and development.

Guided Activities:

The Growth Lab shall incorporate the following guided activities to support the development of students. Here are some examples of guided activities that could be included:

Period Distribution: Depends on the Curriculum Allocation

S.No	Guided Activities	Period
1	**Ethics and Values for Growth** **1. Avoiding Absenteeism** Discuss: Why regular attendance matters? Quick Quiz/Self-reflective worksheet on absenting for something other than being super sick. Brainstorm consequences of absenting often. (becomes a habit, affects productivity, lose inclusivity). How to avoid absenteeism – Initiate group discussion among students. Explain how the habit of absence often affects growth at the workplace. **2. The Importance of Obeying Rules** Talk about college rules and why they're important for students' success. Explain the benefits of following the rules (safe, respectful and productive environment). Consequences of breaking the rules (warnings to fines, academic sanctions, or even expulsion). Connect how the habit of disobeying the rules will affect growth in the workplace. **3. Identifying personal values**	

	Provide self-reflective worksheets to understand how students' get affected when others do not adhere to ethics and values. Help them identify their own ethics and values that they uphold. Explain how upholding ethics and values is important for professional success citing examples from real life. **<u>Suggested Activities (sample – Avoiding Absenteeism)</u>** Peer accountability partner – pair students up and have them check in with each other regularly to ensure both are attending class regularly. Provide statistics on the loss incurred by a company due to frequent absenteeism by employees. Ask students to prepare a comical skit on absenteeism and its consequences.	
2	**Identifying Strengths and Weaknesses** **1. Overcoming Self-doubt** Provide worksheets to check whether the students have felt unsure about doing something new. Briefly discuss self-doubt and how it can feel like a monster holding us back. Introduce strategies to overcome self-doubt - Train the students to say instead of "I can't," say "I'll try my best" or "I'm learning", focus on progress, and learn from mistakes. **2. Overcoming Procrastination** Ask students (worksheet/oral discussion) how they feel when they put off a task until the last minute. Brainstorm the consequences of procrastination (creates a cycle of avoidance and stress). Introduce strategies to overcome procrastination (Breaking down tasks and setting small goals, self-rewarding). **3. Overcoming Distractions** Help students identify the distractions (phones, social media, noise, conflicts with friends, hanging out with friends often, movies). Discuss the impacts of distractions on productivity and growth. Introduce strategies to fight the Distractions (introduce pomodoro	

	technique). **<u>Suggested Activities (sample –Over Coming Self-doubt)</u>** Present a challenge to the students, it could be anything from narrating a story, mimicking, singing, dancing, talking about their family. Encourage them to overcome their self-doubt and perform in front of their classmates. Finally ask them to express how they felt while performing.	
3	**Cultivating Growth Mind-set** **1. Cultivating Determination** Explain what determination is (hard work, not giving up, being ready to face challenges). Show videos/share stories of successful people who overcame challenges to achieve something big for them or the society. Define the ways to cultivate determination (setting SMART goals, learning from mistakes, celebrating every small win). **2. Cultivating Positive Habit Change** **Discuss:** Impact of habits on one's actions and decisions (triggers automatic responses, decision making). Impact on skills and abilities (practice makes progress). Impact on personal growth and well-being (confidence building, positive lifestyle). Impact on overall success (reaching goals, building discipline). Ways to switch to positive habits (use self-reflective worksheets to identify students' habits). **3. Time-management** Teach students the importance of prioritizing tasks for effective results. (important and urgent) Teach them prioritization matrix for organizing tasks, projects and ideas **<u>Suggested Activities (sample – Overcoming Procrastination)</u>** Host a procrastination-free week, ask students to team up and commit	

	to spending a week without procrastinating on any task or assignment. Announce a reward or incentive for the winning team. Also encourage them to share their feeling when they complete the tasks without procrastinating.	
4	**Improving the Basic Skills** **1. Reading, Writing and Speaking Practice** Train the students to read, write and speak fluently in English/Regional language. **2. Letter Writing Practice** Train the students in letter writing in English (leave letter, permission letter, apology letter) by providing them formats. **<u>Suggested Activities (sample -speaking practice)</u>** Create a WhatsApp group and share short animation English videos (maximum one minute long). Ask the students to listen to the dialogues, repeat it in their voice, record the same and send back. Observe their progress through the semester and reward them duly. **Letter Writing Practice** – set up a 'Mysterious Mailbox' in the classroom, encourage the students to write letters (leave letters, permission slips, apology letters), collect the letters and distribute them for others to analyse and give feedback.	
5	**Goal Setting and Mind Mapping** 1. Teach mind mapping & ask students to make mind maps for visualizing their personal goals. 2. Guide students in setting SMART goals for the semester. **<u>Suggested Activities (sample)</u>** Encourage students to take up at least one-value added course and receive certification per semester	
6	**Interpersonal Skills** Introduce the components of Interpersonal Skills such as: Communication Skills (verbal/non-verbal communication) Speaking, listening, body language. Problem-solving Skills (conflict resolution, negotiation, team work).	

	Team work. Flexibility. Patience. Educate students that how interpersonal skills help in building healthy relationships in personal and professional life. **<u>Suggested Activities (Sample)</u>** Organize a guest lecture on the importance of interpersonal skills by inviting a HR Personnel to educate the students (Especially communication skills)	
7	**Interview Skills** Introduce Resume Writing to students (conduct frequent resume writing drills through the semesters, and ask them to review the same to understand whether they have progressed in all areas). Train the students in self-introduction. Train the students in group discussions (Initiating a discussion, countering participants, using appropriate phrases to interrupt etc.). Introduce Interview ethics (body language, grooming, presentation). Cultivating the habit of researching (to know the profile of companies, their operating style, activity) **<u>Suggested Activities (sample)</u>** Conduct frequent mock interviews to train the students in the above interview skills. Stream videos of mock interviews.	
8	**Utilizing the Available Resources for Growth** Arrange a campus tour for the students to know the available facilities such as libraries, laboratories etc. Encourage the students to enrol in (online/offline) courses available in the college. Guide the students to use social media for their personal and professional growth (browsing for the latest trends in engineering and technology, following entrepreneurs on social media to understand	

	their journey, to check for institutions for higher studies etc). **Networking & Connecting** Help students connect with their alumni for guidance for their studies and career growth. Encourage students to follow entrepreneurs, eminent businessmen on a regular basis to stay updated and ask them to share the information in the class to inspire others. **<u>Suggested Activities (sample – Networking and connecting.</u>** Identify alumni who would be interested to contribute for the growth of the students and connect them with students for guidance in their studies and career growth.	
9	**Final Oral Presentation & Impact Assessment: *** 1. Give students an opportunity to present their semester's journey and the changes they have experienced. 2. Faculty shall compile a brief report assessing program impact based on student feedback.	

Closure: End of the semester a half-day session shall be given for the students to share their transformation and feedback can be collected about his self-reflection on the impact of the program. The faculty must submit a brief report by assessing every student's development on the impact of the program, comparing their initial state at the beginning of the semester with their progress at the end.	
Assessments: ● Use self-reflective worksheets to assess students' understanding. ● Subject the worksheets to internal/external audit.	

References / Resource Materials:

For the Growth Labs, the following references and resource materials may be utilized to support the learning and development of the students:

1. Facilities & Spaces: Growth labs may require access to specific facilities, resources or spaces. Faculty may need to coordinate with the college administration to reserve these as required.

Online Resources:

1. How to Begin Your Self-Discovery Journey: 16 Best Questions https://positivepsychology.com/self-discovery/
2. How to break a bad habit? https://www.health.harvard.edu/blog/how-to-break-a-bad-habit-202205022736
3. How To Mind Map Yourself For Growth? https://mindmapsunleashed.com/how-to-mind-map-yourself-for-growth
4. Interpersonal Communication and Its Importance at Work https://www.indeed.com/career-advice/career-development/importance-of-interpersonal-communication
5. Personal Responsibility: Embracing Accountability in Life https://www.graygroupintl.com/blog/personal-responsibility
6. The Power of Prioritization: Why You Need It in Your Life https://medium.com/@Jd-Lewis/the-power-of-prioritization-why-you-need-it-in-your-life-5fd49c7c2f6c#:~:text=Prioritization%20helps%20you%20make%20informed,achieve%20more%20in%20less%20time.
7. How To Write An IT Fresher Resume: A Step-By-Step Guide https://in.indeed.com/career-advice/resumes-cover-letters/how-to-write-it-fresher-resume
8. How to Overcome Self Doubt https://www.wikihow.health/Overcome-Self-Doubt
9. The Surprising Health Benefits of Bird-Watching https://www.nytimes.com/2022/12/10/well/move/bird-watching-health-benefits.html
10. Positive Daily Affirmations: Is There Science Behind It? https://positivepsychology.com/daily-affirmations/

- - - - 23 - 881*	**Induction Program**
AUDIT	

*(First four digits in the subject code is branch code and Seventh digit is Semester)

Induction Program - I (One Week) Should be scheduled at the First Week after reopening as per the schedule.

Induction Program - II (As per the curriculum) Should be scheduled in the beginning of the III Semester.

Induction Program - III (One Week) Should be scheduled at the beginning of the V Semester.

Skill Areas:

Interpersonal Skills, Academic Orientation, Technical Skills Development, Soft Skills and Communication, Study Skills and Time Management, Healthy and Safety Environmental Awareness, Ethics and Professionalism, awareness on drug addiction and its related physical and mental health issues, Career Guidance and Industry Interaction, Extracurricular Activities and Personal Development.

Purpose:

The transition from school to college life is one of the most challenging events in a student's life. The Induction Programme helps new students adjust, learn institutional values, build bonds, and explore the institutional policies, processes, practices, culture, universal human values, and get introduced to DOTE regulations, overview of the diploma programme, and prospective skill areas.

Learning Outcomes:

At the end of the course, students will be able to:

1. Feel comfortable in the new college environment.
2. Understand the curriculum, preparing for their academic journey comprehensively.
3. Get introduced to various committees recommended by AICTE
4. Experience diverse activities, promoting holistic development.
5. Connect with faculty, including the Principal, HoD, and department faculty.
6. Interact with industry professionals and alumni.
7. Learn about the resources needed for skill development.
8. Understand professional ethics and responsibilities in technical fields.
9. Aware of career opportunities and pathways in technical fields

10. Aware of student support services, including counselling and mentorship.
11. Train in effective communication, presentation skills, public speaking, teamwork and collaboration exercises.
12. Awareness of drug addiction and its related health issues.

Focus:

The induction program focuses on providing clarity and support for a successful academic journey and holistic development of students. Key areas include adjustment, comfort in the new environment, fostering institutional culture, building bonds, and promoting self-exploration. Some key focus areas include,

1. Credit System and GPA/CGPA Assessment.
2. Diverse Classes at the End.
3. Theory, Laboratory, and Practicum Sessions.
4. Assessment Methods.
5. Internship Opportunities.
6. Fast Track Courses.
7. Exposure to Extracurricular Activities.
8. Course Add/Drop.
9. Examination Withdrawal.
10. Role of a Mentor.
11. Choosing Pathways.
12. The importance of understanding the Universal Human Values.
13. Role of DOTE in diploma programme.
14. Role of AICTE in diploma programme and the various committees and their objectives recommended by Dote and AICTE.

Role of the Facilitator

The SIP committee comprises the Head of the Institute, Heads of various departments, Senior Faculty, Senior Students (Second and Final Year), and Alumni. Their roles are as follows:

1. **Head of the Institute:** Explains new regulations from DoTE, institute rules, and significant changes in the new regulations.
2. **Head of the Department:** Walks through department facilities, and discusses achievements of senior and alumni students, placement training and assistance, Entrepreneur development activities, higher education ideas.
3. **Senior Faculty**: Guides diploma students on post-program pathways with faculty

mentor assistance.

4. **Senior Students:** Introduce student clubs, and conduct department and lab tours.
5. **Alumni:** Share the growth opportunities available to diploma students, recent trends and placement opportunities in the relevant field, entrepreneurship ideas and the available resources for the same.

Guided Activities:

The SIP should have the below list of activities.

Period Distribution

Induction Program - I

S.No	Guided Activities	Period	Day
1	Registration, Formation of student classroom groups of respective programs & Formation of Student Representatives		
2	Presentation cum Interactive Session with Important Institution Functionaries like Head of Institute, Principal, HoDs, etc.		
3	Visit to departments & facilities of the Institution. Motivate students to utilize library, sports facilities, Institution Innovation Council's (IIC) opportunities, Entrepreneur Development Cell, Skill Development and Training facilities, Placement opportunities and other amenities		
4	Ice breaking activity for the new students & Self Introduction of some newly joined students		
5	Introduction to Various Clubs & Community Initiatives; A short session on the importance of joining such initiatives will be taken. The activities may include: Cultural Activities, Movie shows,		

	Sports Activities, Visits to museum, community centres, club relevant field visits. Quiz Literary Activities such as, Tamil/English debate, discourses etc..		
6	Introduction to Committees/Associations and their Functions. (Committees of High Importance) Vishaka Committee Anti-ragging Committee Grievance Redressal mechanism SC/ST Committee etc. **Other Preferred Committees/Associations** Alumni Association etc. Department Associations		
7	Interaction with Senior Students		
8	Interaction with Alumni Students		
9	Talks, Lectures or Workshops by Eminent People from varying domains - This may include hackathon, ideation camps, motivational talks, personality development, universal human values, career development, group activities, social awareness lectures etc		
10	Talk on Respective Program scheme of studies and details of courses, examination pattern, types of courses, credit system, assessment methods, examination withdrawal, internship, passing and eligibility criteria, attendance requirements and board exam guidelines by respective program coordinator Educate the students on the importance of preparing reports on internships attended during the programme		

11	Industrial Interaction; Local Industrial Visits or Interactions with Industry Experts invited to the Induction. Providing guidelines on following safety measures, undertaking from both students and parents, maintaining discipline during these activities		
12	• Awareness talks on “drugs and its ill effects” should be arranged. • College authorities has to explain the various mechanism to control the drug consuming and peddling drugs in their college premises		
Induction Program - II The induction programme for the Second Year can be planned. (You may include the above mentioned activities) in addition to the following activities. Emphasis on the importance of improving the academic performance as the students are in their Second Year. Guide students for the Academic and Internship Programmes. Guide students on choosing the elective subjects. Guide students on ● Project Selection. ● Student Batch Identification. ● Financial Planning and Transparent Transaction. ● Synopsis Writing. ● Execution of the Project. ● Project Reviews and Presentation. ● Preparing Project Report. ● Project Assessment Pattern. ● Board Exam Evaluation Pattern. ● Dote Prescribed Norms for the Project. Awareness program of, ● Anti-ragging guidelines,			

• Internship policy guidelines & procedures • Grievance Redressal mechanism • Vishaka committee guidelines • Sexual Harassment of Women (Prevention, Prohibition and Redressal) • Awareness talks on “drugs and its ill effects” should be arranged. • College authorities has to explain the various mechanism to control the drug consuming and peddling drugs in their college premises		
Induction Program - III The induction programme for the Final Year. (You may include the above mentioned activities in addition to the following activities). As the focus and the weightage are mainly on project work, internship and fellowship: Impart in depth Knowledge on • In-house projects • Internship • Fellowship Instruct the Dos and Don’ts on the above. Guide students on the report preparation for the above. Explain the DOTE’s Objective behind the periods allotted for the above. A Talk by training and placement cell; Career opportunities for students, placement activities in college; placement process which includes introduction to platforms that offer value-added courses such as: SWAYAM NPTEL, CIICP, TCS ION CAREER EDGE, Self-assessment Platform - Parakh Portal. Awareness Program on Competitive Exams such as TNPSC, SSC, JEEE. Introduction to AICTE internship programs.		

Awareness Program about the Non Resident Tamils Rehabilitation and Welfare. Experts from the Commissionerate of Rehabilitation and Welfare Non Resident Tamils can be called for this session. The following contents can be included. Understanding the different types of migration and employment opportunities. Learning about the legal requirements and documentation needed for migration. Exploring the cultural and social aspects of living and working in a foreign country. Identifying common challenges and risks associated with migration, such as exploitation, discrimination and human trafficking. Providing guidance on how to reach and evaluate potential employers and job offers. Educating students about their rights and responsibilities as migrant workers. Offering practical advice of financial management, healthcare, and personal safety while abroad. Highlighting the importance of maintaining communication with family and seeking support when needed. By incorporating this into the induction program, we can empower our youth with the knowledge and skills they need to make informed decisions and migration and protect themselves from potential risks.		

Recording the Activities

SIP is intended for ice-breaking and familiarization purposes; hence no student assessment is required. However, documenting visitors' and students' feedback is highly recommended. Also, submitting the prepared report for internal/external audit is encouraged.

For every induction programme conducted, a report may be prepared in the following format.

Preparing Invitation and Poster

Report

Programme:

Theme:

Duration:

Date/Time:

Resource Person (internal/External):

Objective:

Outcomes:

Photograph:

Feedback:

Collection of student feedback on induction program - Make a report of Induction program by collecting student feedback

References/Resource Materials:

Regulation 2023 (R-2023) SOP given by DoTE.

60 Awesome Icebreakers for Orientation and Beyond:

https://sapro.moderncampus.com/blog/60-awesome-icebreakers-for-orientation-and-beyond

AICTE INTERNSHIP POLICY GUIDELINES & PROCEDURES

http://www.aicte-india.org/sites/default/files/Aicte%20Internship%20Policy-%2002.04.2019.pdf

AICTE Link Safety of Students in and Outside of Technical Campus

https://www.aicte-india.org/downloads/AICTE_Circular.PDF

Grievance Redressal mechanism:

https://aicte-india.org/bureaus/grievance-redressal

https://www.aicte-india.org/sites/default/files/approval/2023-24/Appendix-6.pdf

Vishaka committee guidelines:

https://www.vishaka.org/#:~:text=Vishaka%20reinforces%20ICC%20formation%20with,Right%20Act%20of%201964%20compliance.

Anti-ragging guidelines: https://www.aicte-india.org/downloads/Antiragging.doc

GUIDELINES

Induction Program - I (One Week) Should be scheduled at the First Week after reopening as per the schedule.

Day 1: FN: Registration and Inaugural Session.

(Welcome and Brief about the college, and their academic program. Rules and Regulation guidelines, Orientation, Familiarization College, Dept./ Branch)

Day 1: AN: Familiarization about the Dept./ Branch.

Day 2: FN: Literary activity

Day 2: AN: Proficiency Modules

Day 3: FN: Lectures & Workshops by Eminent People

Day 3: AN: Visits to the College Common areas, Respective Department facilities.

Day 4: FN: Extra-Curricular Activities in College, Awareness talk on Drug addiction and its ill effects

Day 4: AN: Mentor-mentee groups meet

Day 5: FN: Interaction Session

Day 5: AN: Feedback and Report on the Program and Valedictory Session

Note: Inauguration and Valedictory can be conducted commonly; other sessions can be organised in the respective department.

Induction Program - II (As per the curriculum) Should be scheduled in the beginning of the III Semester.

Brief sessions about the importance of the Diploma Program, Growth and opportunity for higher education and employability.

Guidelines to select the Electives and Projects. Alumni, Industrial experts and Senior faculties can be engaged for this program.

Conduct Awareness programs on Drug addiction and its ill effects

Induction Program - III (One Week) Should be scheduled at the beginning of the V Semester.

Day 1: FN: In-house projects, Internship, Fellowship

Day 1: AN: Online Skill Courses

Day 2: FN: Employability Skills - I (Industry Awareness and Trends)

Day 2: AN: Employability Skills - II (Resume Building and Job Application Skills)

Day 3: FN: Employability Skills - III (Interview Preparation, Technical Skill Enhancement)

Day 3: AN: Employability Skills - IV (Soft Skills and Communication)

Day 4: FN: Employability Skills - V (Entrepreneurship and Innovation)

Day 4: AN: Employability Skills - VI (Career Counselling and Guidance)

Day 5: FN: College to Corporate (Ethics and Professionalism, Emotional Intelligence and

Stress Management)

Day 5: AN: Non Resident Tamils Rehabilitation and Welfare Program

- - - - 23 - 884*	**Student-Led Initiative**
AUDIT	

*(First four digits in the subject code is basic Engg. / branch code and Seventh digit is Semester)

Skill Areas:

Team Work, Presentation Skills, Communication.

Purpose:

The aim is to promote active participation and collaboration among students, allowing them to learn from each other. One such initiative is the student-led tech talk series, where students can share knowledge and explore new technologies. These initiatives also provide resources and support to help students achieve their personal and career goals with guidance from the educational institutions.

Learning Outcomes:

At the end of the course, students will be able to:

1. Collaborate and Communicate effectively
2. Develop interpersonal skills with self-confidence and resilience
3. Foster a culture of collaborative learning with peers by sharing knowledge effectively.

Focus:

When conducting a student-led initiative, there are several focus areas that students should keep in mind to ensure a successful and impactful endeavour. Here are some key areas to consider:

1. Teamwork
2. Planning and Execution
3. Personal Growth and Learning

Role of the Facilitator:

The role of a college faculty facilitator in student-led initiatives is crucial in providing guidance, support, and mentorship to the student participants. Here are some key aspects of the faculty facilitator's role:

1. **Mentorship and Coaching:** Faculty facilitators act as mentors, providing one-on-one or group coaching to students involved in the initiative. The faculty facilitator serves as an

advisor, offering expertise, knowledge, and feedback to guide students in the planning and implementation of their initiatives.

2. **Resource Support:** Faculty facilitators assist students in accessing resources necessary for the success of their initiatives. They can help students identify relevant research or technical expertise.

Guided Activities:

In a student-led initiative, various guided activities can be implemented. Here are some guided activities to be undertaken:

1. Identify Technology Areas/Themes
2. Team Formation for the Presentation
3. Oral Presentation Preparation
4. Oral Presentation
5. Feedback
6. One Page Report

Note: *The student teams are expected to conduct an Oral Presentation in a seminar format, which means they* ***don't*** *need to create presentation slides. Instead, they will present their content through verbal communication during the presentation.*

Period Distribution

S.No	Guided Activities	Period
1	Introduction and Briefing 1. Identification of 8-10 Emerging Trends/Technology by the faculty 2. Briefing of the 8-10 Emerging Trends/Technology to the students	
2	Team Formation for the Presentation 1. Team of 4 students are formed based on the topic that is selected 2. Faculty assigns the roles and responsibilities of each student in the team	

3	Oral Presentation Preparation 1. Students browse the topics or go to the library to learn the topics for the presentation 2. Students develop contents for the presentation 3. Faculty mentor the students to form a outline for the presentation in the following format a. Introduction b. Working Principle c. Advantages & Limitations d. Applications	
4	Oral Presentation 1. Students need to prepare & deliver the Oral presentation based on guidelines prescribed by the Faculty mentor 2. Deliver within the allotted time of 15 minutes 3. Include a Q&A Section covering a maximum of 3 minutes	
5	Feedback 1. Mentor gives the feedback to the student team about a. Presentation Contents b. Presentation Delivery/Quality c. Suggestions for improvisations for individual student	
6	One Page Report 1. Each Student submits a handwritten one-page summary of the oral presentation	

Rubrics for the Evaluation

Category		SCORE			
		5—Excellent	**3—Good**	**2—Fair**	**1—Needs Improvement**
A	**Quality of oral Presentation**	Well-structured Content and clear presentation; engages the audience with good preparation and confidence.	Sufficiently clear content and reasonably organized; presents with moderate confidence.	Somewhat clear with basic organization; needs improvement in coherence and confidence.	Unclear about topic and disorganized presentation; lacks coherence and preparation.
B	**Communication**	The delivery is confident, natural, and engaging. The student maintains excellent eye contact, gestures appropriately, and uses a clear and well-modulated voice.	The delivery is mostly confident and engaging but may have some minor areas for improvement in eye contact, gestures, or vocal delivery.	The delivery is somewhat engaging, but there are noticeable issues with eye contact, gestures, or vocal delivery.	The delivery is hesitant, and the student struggles with eye contact, gestures, or vocal delivery.
C	**Teamwork**	The team runs perfectly coordinated, with clear guidelines about each member's role. Each member has participated.	The team was mostly coordinated, but there were some moments of doubt and/or unbalance. A minority of the members of the group did not know what to do.	One or two members of the group have focused most of the presentation. The rest of the group did not have clear instructions about their role.	The team did not know when to speak, or what role they were having. Only one person leads the group.
	SCORE	(A+B+C)/15 Points			

Closure:

After finishing their student-led initiatives, each team member must write a one-page summary of the oral presentation by hand. This summary should include topics covered in the Oral presentation.

Assessments:

No formal assessments are required for the student-led initiatives since it's just a platform for peer-to-peer to exchange knowledge and skills.

References/Resource Materials:

Student-led initiatives may require a variety of resource materials to support their planning, implementation, and success. Here are some general requirements:

1. **Informational Resources:** These include textbooks, reference materials, and online information relevant to the topic or theme of the initiative.
2. **Facilities and Spaces:** Some initiatives may require access to specific facilities or spaces for presentations. This can include classrooms, laboratories, meeting rooms, performance spaces, exhibition halls, or outdoor areas.
3. **Online Resources:**
    1. How to Do a Presentation in Class? - https://www.wikihow.com/Do-a-Presentation-in-Class
    2. How to Give a Short Class Presentation Competently? - https://www.instructables.com/How-to-Give-a-Short-Class-Presentation-Competently/
    3. Best Practices for Oral Presentation: https://www.uow.edu.au/student/learning-co-op/assessments/presentations/
    4. How to keep up with the latest emerging trends? - https://pakwired.com/latest-technology-trends/
    5. Body Language Tips for Presentation - https://www.toastmasters.org/resources/public-speaking-tips/gestures-and-body-language

- - - - 23 - 883*	**SHOP FLOOR IMMERSION**
AUDIT	

*(First four digits in the subject code is Basic Engg. / Branch code and Seventh digit is Semester)

Skill Areas: 5S Methodology, LOTO, Six Sigma, ISO, SAP, Agile Methodology, etc…

Note: Any one industrial practices can be planned for every semester.

Purpose:

First semester, students will learn about the importance of '5S' through a shop floor workshop. '5S' helps reduce waste and improve productivity by organizing the workplace and using visual cues. It involves five steps: sort, set in order, shine, standardize, and sustain.

Learning Outcomes:

At the end of the course, students will be able to:

1. Creates an organised and clean environment in their lab/workshop
2. Acquire self-discipline as they need to maintain the standards
3. Identify and eliminate wastes
4. Creating a safe workplace by reducing accidents caused by external factors

Focus:

This course introduces the important concept of 5S, a fundamental skill used in various industries. It focuses on workplace organization and efficiency, which is essential for students entering the industry.

The 5S Methodology includes five steps:

- Sort: Remove unnecessary items to tidy up the space.
- Set In Order: Organize the work area with a place for everything.
- Shine: Clean and maintain the area to prevent dirt and grime.
- Standardize: Create written procedures to make new practices a norm.
- Sustain: Continuously commit to maintaining the organized and efficient workspace.

Additionally, safety is integrated throughout all the steps to improve workplace safety, not just efficiency.

Role of the Facilitator:

Faculty introduce the concepts of 5S to the students and assign a specific activity to each team of 4 students and guide them to implement 5S to a specific lab or workshop.

Guided Activities:

In the shop floor immersion course, few activities can be implemented to reach the desired course outcome. Here are some guided activities to be undertaken:

1. **Workshop (Learning Session):** The Faculty can take a session 5S Methodology covering the aspects of 5S like; What is 5S?, Why use 5S?, Advantages & Limitations, Case Studies, The 6th S - Safety.

2. **5S Implementation:** Students will implement 5S in a chosen lab. Faculty guides lab selection, assesses its state, gathers inventory, plans resources. After implementation, a post-assessment is done with faculty guidance.

Period Distribution

S.No	Guided Activities	Period
1	Workshop (Learning Session) 1. Faculty will conduct Session on 5S Methodology and its significance in the industry 2. Faculty need to conduct a Q&A Section to address questions, concerns & clarifications related to 5S	2
2	5S Implementation 1. Preparation: a. Faculty should identify lab/workshop needing 5S implementation b. Faculty will form a teams of 4 students	6

	2. Implementation a. Develop an implementation plan for 5S b. Document lab's current state by taking a photograph c. Proceed with the implementation of 5S by assigning specific jobs to the student teams.	

Closure:

The faculty in charge of the session is responsible for maintaining a one page record of the 5S implementation in the lab along with the "before" and "after" photographs.

Assessments:

No assessments are required for students. The facilitator monitors & guides the students to implement the practical implementation of 5S in the lab/workshop.

References/Resource Materials:

The references and resource materials required may differ depending on the department and type of lab 5S implementation is done. However, here are some general reference materials and resources that may be helpful:

1. **Facilities and Spaces:** 5S Implementation may require access to specific facilities or spaces. This can include access to workshops or labs.

2. **Online Resources:**
    1. What is 5S?: https://www.graphicproducts.com/articles/what-is-5s/
    2. 5S Guide: Improve efficiency with effective organisation: https://leanscape.io/what-is-5s-and-what-are-its-benefits/
    3. How to implement 5S in Workplace? https://www.simplilearn.com/implementing-5s-methodology-to-achieve-workplace-efficiency-article

Note: Every semester any one activity can be planned as above.

- - - - 23 - 885*	**Emerging Technology Seminars**
AUDIT	

*(First four digits in the subject code is Basic Engg. / Branch code and Seventh digit is Semester)

Skill Areas:

Knowledge Enhancement, Communication Skills, Confidence Building, Awareness of Trends.

Learning Outcomes:

1. Research Skills: Students learn how to gather information, analyze data, and present findings. This enhances their research abilities.
2. Presentation Skills: By delivering seminars, students improve their presentation techniques, including slide design, body language, and engaging with the audience.
3. Critical Thinking: Preparing for seminars encourages critical thinking. Students evaluate different perspectives, assess evidence, and form well-reasoned arguments.
4. Networking: Seminars provide opportunities to connect with industry professionals, guest speakers, and fellow students. Networking is crucial for future career prospects.
5. Time Management: Balancing seminar preparation with other academic tasks teaches students effective time management.

Role of the Facilitator:

The department faculty will be the facilitator. All the students will be given opportunity to prepare a seminar on the selected topic during the Library periods also. Each student should present on topic for about 10 minutes. The faculty in-charge should make the necessary facility for the presentation. The HOD is requested to deploy at least two staff members for the Assessment during the presentation.

Guided Activities:

Preparation

1. Select a Relevant Topic:
    - Choose an emerging technology that is relevant to the engineering field and has significant current and future impact.

- Ensure the topic is neither too broad nor too narrow, allowing you to cover it comprehensively within the given time.

2. Research Thoroughly:
    - Gather information from reputable sources such as academic journals, industry reports, and expert interviews.
    - Stay updated with the latest developments and advancements related to your chosen technology.
3. Define Objectives:
    - Clearly outline the learning objectives of your seminar. What should the audience learn or understand by the end of your presentation?
4. Structure Your Presentation:
    - Introduction: Introduce the topic and explain its importance.
    - Body: Discuss the key aspects of the technology, including its principles, applications, benefits, and challenges.
    - Conclusion: Summarize the main points and discuss future prospects.
5. Create Visual Aids:
    - Develop slides that are visually appealing and easy to understand.
    - Use diagrams, charts, images, and videos to illustrate complex concepts.
    - Keep text minimal on slides; use bullet points and short phrases.
6. Prepare Supporting Materials:
    - Provide handouts or digital resources for further reading.
    - Prepare a list of references and sources for credibility.

Presentation

1. Practice:
    - Rehearse your presentation multiple times.
    - Time yourself to ensure you stay within the allotted time.
    - Practice in front of friends or colleagues to get feedback.
2. Engage Your Audience:
    - Start with a compelling opening to grab attention.
    - Use questions and interactive elements to involve the audience.
    - Encourage participation and allow time for Q&A sessions.
3. Communication Skills:
    - Speak clearly and confidently.
    - Maintain eye contact with your audience.

- Use appropriate gestures and body language.

4. Use Technology Effectively:
    - Ensure your presentation equipment (laptop, projector, microphone) is set up and functioning properly.
    - Be familiar with the software you are using for your slides.
5. Handle Questions Gracefully:
    - Listen carefully to questions from the audience.
    - Answer clearly and concisely. If you don't know the answer, acknowledge it and offer to find out later.

Follow-Up

1. Feedback:
    - Collect feedback from your audience to understand what worked well and what can be improved.
    - Use this feedback to refine future presentations.
2. Provide Additional Resources:
    - Share your presentation slides and any additional resources with your audience.
    - Offer to answer further questions via email or a discussion forum.
3. Stay Updated:
    - Continue to follow developments in your chosen technology area.
    - Update your presentation and materials as new information becomes available.

Rubrics for the Evaluation:

1. **Content Quality (40%)**
    - Relevance: The topic is relevant to the field of engineering and is current.
    - Depth of Research: The presentation demonstrates thorough research with accurate and up-to-date information.
    - Clarity of Objectives: Clear objectives are defined and met during the presentation.
    - Comprehensiveness: The topic is covered comprehensively within the scope and time limits.
    - Accuracy: Technical details are correct and well-explained.

2. **Presentation Skills (30%)**
    - Clarity and Coherence: The presentation is clear, logically structured, and easy to follow.
    - Engagement: The presenter engages the audience and maintains interest throughout the presentation.
    - Communication: The presenter speaks clearly and confidently, using appropriate language and terminology.
    - Visual Aids: Slides and other visual aids are well-designed, relevant, and enhance the presentation.
3. **Delivery (20%)**
    - Confidence and Poise: The presenter appears confident and handles the presentation smoothly.
    - Body Language: Appropriate body language, gestures, and eye contact are used.
    - Time Management: The presentation is well-timed, adhering to the allotted duration.
    - Handling Questions: The presenter answers questions clearly and accurately, demonstrating a good understanding of the topic.
4. **Originality and Creativity (10%)**
    - Innovative Approach: The presentation includes original ideas or perspectives.
    - Creativity: The presenter uses creative methods to explain concepts and engage the audience.

Assessment Process

1. **Pre-Presentation Briefing:**
    - Provide students with the evaluation criteria and explain how they will be assessed.
    - Ensure students understand the importance of each criterion.
2. **During the Presentation:**
    - Use a standardized evaluation form to score each criterion. This ensures consistency and fairness.
    - Have multiple assessors, if possible, to provide a balanced evaluation. Assessors can be faculty members, industry experts, or peers.

3. **Post-Presentation Evaluation:**
    - Assessors should meet to discuss and finalize scores.
    - Provide detailed feedback to students, highlighting strengths and areas for improvement.

Assessments:

Sample Evaluation Form

Criteria	Weight	Score (1-10)	Comments
Content Quality	40%		
Relevance			
Depth of Research			
Clarity of Objectives			
Comprehensiveness			
Accuracy			
Presentation Skills	30%		
Clarity and Coherence			
Engagement			
Communication			
Visual Aids			
Delivery	20%		
Confidence and Poise			
Body Language			

Time Management			
Handling Questions			
Originality and Creativity	10%		
Innovative Approach			
Creativity			
Total Score	100%		

Feedback

1. Individual Feedback:
    - Provide each student with detailed feedback on their strengths and areas for improvement.
    - Use the comments section in the evaluation form to offer specific suggestions.
2. General Feedback:
    - Share common strengths and areas for improvement with the entire class to help all students learn and improve.
3. Follow-Up:
    - Offer opportunities for students to discuss their feedback with assessors.
    - Encourage students to apply feedback in future presentations and projects.

By following these guidelines, you can ensure a fair, transparent, and constructive evaluation process that helps students improve their seminar presentation skills.

- - - - 235887*	**Special Interest Groups (Placement Training)**
AUDIT	

*(First four digits in the subject code is Branch code)

Note: Training related to enhance the employability skill can be conducted during this period.

- - - - 23 - 882*	**I&E / Club Activity / Community Initiatives**
AUDIT	

*(First four digits in the subject code is Basic Engg. / Branch code and Seventh digit is Semester)

Club Activity

Skill Areas: Collaboration, Ownership, Interpersonal Skills
Purpose: Club activities provide a platform for students with similar interests to engage, participate in events, workshops, and competitions. This fosters collaboration and skill development in various fields.
Learning Outcomes: At the end of the course, students will be able to: 1. Collaborate and work in interdisciplinary teams towards contributing effectively 2. Learn or enhance skills through workshops, competitions, and experiential learning.
Focus: During club activities students should prioritize key focus areas to enhance their learning and impact. Here are some focus areas to consider: 1. Collaboration & Communication 2. Identify strengths and weaknesses, and learn from experiences to foster personal growth
Role of the Facilitator: The faculty facilitator's role is crucial in guiding and supporting students in club activities. Key aspects of their role include:

1. **Mentorship and Guidance:** Faculty facilitators act as mentors, providing one-on-one or group guidance to students involved in the club.
2. **Creating a Supportive Learning Environment:** Facilitators will nurture a supportive, inclusive environment in the clubs where students freely express and learn collaboratively. They provide a platform for like-minded students to engage, collaborate, and participate.

Guided Activities:

For Club Activities, students can engage in learning and developing a new skill or enhancing their skill by involving & actively participating in one or more clubs of their interest. These clubs can be used as a platform for Personal growth.

They may include but are not limited to the following clubs: Tamil Mandram, Music, Dance, Math, Chess, Arts, Anti-drug, Photography, Sports, Astronomy, Science, Robotics, English, Theatre, NCC, NSS, Digital Media Club, Cooking, UN Sustainable Development Goal, YRC (Youth Red Cross), Olympiad clubs, etc. The Outcome can be achieved through conducting **Competitions and Challenges.**

Period Distribution

S.No	Guided Activities	Period
1	Enrolment to Clubs 1. Invite club representatives along with Faculty to give short presentations, and collect names of students who are interested to join 2. Students should list their top 3 preferred clubs based on their interests and submit to the respective club representative	
2	Exploring of Clubs 1. Ensure students understand their responsibilities as club members. 2. Emphasize the importance of commitment and regular participation. 3. Explore with club representatives about planning and hosting competitions, or events for the club.	

3	Learn & Exhibit 1. Encourage students to participate actively and showcase their skills. 2. The Faculty should provide a necessary platform to enhance students skills, learn new skills, and exhibit skill through various competitions, events or initiatives.	
4	Recognition 1. Acknowledge the efforts and contributions of individual members as well as the whole club	

Closure:

No formal documentation is needed for course completion, but students must participate in at least one or more of the clubs meeting the 30 Period Requirement.

Assessments:

No formal assessments are required for the Innovation and Entrepreneurship, Cub activities or Community Initiatives.

References/Resource Materials:

The references and resource materials required for club activities may vary based on the personal focus, goals, and also resources available at each college. However, here are some general reference materials and resources that may be helpful:

1. **Facilities and Spaces:** Some clubs may require access to specific facilities or spaces. This can include classrooms, laboratories, meeting rooms, performance spaces, exhibition halls, or outdoor areas.
2. **Coaching:** Students may require coaching from faculty members or professionals with relevant knowledge and experience related to the club.
3. **Online Resources:**
    1. How to choose the Right Club for your personal growth? https://www.topuniversities.com/student-info/student-stories/5-common-mistakes-avoid-when-choosing-student-clubs
    2. How to make your club great? https://www.pearson.com/ped-blogs/pearsonstudents/2021/04/11-tips-to-

make-a-any-college-club-great.html

Note: Innovation & Entrepreneurship and Community Initiatives awareness program and activities can also be conducted.

STUDENT INDUCTION PROGRAM CELL (SIP CELL)

The Principal or HOD will be the Chairman of the Student Induction Program Cell.

SIP Cell (or Induction Unit) will be managed by the department faculty members with the help of student volunteers.

The SIP Cell will be responsible for planning, organization, coordination and reporting of the annual Student Induction Program with the help of other faculty members and student volunteers.

Students Counselling Service (SCS)

In order to provide advice or help to the students of the institute, Student Counselling Service (SCS) needs to be initiated. Team of SCS will assist and strengthen the students at the institute for enhancing their academic skills and career developments, as well as for their overall wellness.

Student Coordinators may be appointed with the guidance of a staff mentor.

1. Wellness Coordinator.
2. Skills Coordinator
3. Career Coordinator
4. Academic Coordinator etc…

OBJECTIVE:

The objective of the SIP cell is

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

OUTCOME:

At the end, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Note: ILE activity can be conducted and monitored by the SIP Cell.