Title of Course:	**:**	**Hydrology (1 + 1)**			
Course Code	**:**	CET301			
Semester	**:**	5^{th}			
Technology	**:**	Civil Engineering Technology			
Effective	**:**	22 – Batch and onwards			
Pre-requisite	**:**	Nil			
Co-requisite	**:**	Nil			
Assessment		**Theory** Quizzes/Test (s): 05 Marks Assignments/Projects/Presentations :05 Marks Mid Semester Exam: 15 Marks Final Semester Exam: 25 Marks	**Practical** Lab Rubrics: 30 % Open Ended Lab/Mini Project: 20 % Final Exam; Objective Test*: 30 % Final Exam; Conduct of Practical/Viva Voce*: 20 % *Appearance in Final Exams is mandatory		
Credit Hours/week	**:**	**Th**	1	**Pr**	1
Minimum Contact Hours	**:**	**Th**	16	**Pr**	48
Marks	**:**	**Th**	50	**Pr**	50

After Completing the Course, each student will be able to:

Sr. No.	Theory/ Practical	CLO	Taxonomy Level	PLO
1	Theory	**ANALYZE** the occurrence, movement, and distribution of water in the atmosphere, on and below the ground surface.	C4	4
2	Theory	**APPLY** the principles of groundwater movement for lifting of sub-surface water.	C3	3
3	Practical	**DEMONSTRATE** experimental investigations related to various hydrological parameters.	P3	9
4	Practical	**SOLVE** the measured hydrological parameters	A2	1

Relevant Program Learning Outcomes (PLOs):
The course is designed so that students will achieve the following PLOs:

1	Engineering Technology Knowledge:	√	7	Environment and Sustainability:	
2	Problem Analysis:		8	Ethics:	
3	Design/Development of Solutions:		9	Individual and Team Work:	√
4	Investigation:	√	10	Communication:	
5	Modern Tool Usage:		11	Project Management:	

6	The Engineering Technologist & Society:	√	12	Lifelong Learning:	

OBJECTIVES:

- To be able to analyze the occurrence, movement, and distribution of water in the atmosphere, on and below the ground surface.

COURSE CONTENTS:

- **Introduction:** Hydrology, Hydrologic cycle, Hydrologic equation.

- **Hydrologic Processes and their Computation:** Wind, Temperature, Relative humidity, Solar radiation, Precipitation, Evaporation, Transpiration, Evapotranspiration, Runoff, and their measurement/estimation. Data networks, Telemetry systems and Remote sensing. Analysis and application of Hydrograph and Unit hydrograph.

- **Floods- Estimation, Routing and Control:** Types of floods based on flowrate, Estimation of peak flood, Flood forecasting and warning.

- **Groundwater and Well Hydraulics:** Basic terminology, Types of aquifers, Yield of a well, Well losses, Specific capacity of well, Interference among wells.

- **Tube Wells:** Types and Parts of tube well, Tube well construction.

PRACTICAL WORK TO BE CARRIED OUT:

1. To measure daily evaporation using evaporation pan.
2. To measure daily minimum and maximum temperature.
3. To measure wind speed and direction using anemometer and wind vanes.
4. To measure relative humidity.
5. To measure rainfall depth of a storm event using non-automatic rain gauge
6. To obtain rainfall hyetograph of a storm event using an automatic rain gauge.
7. To study the rainfall-runoff characteristics of a long duration single storm rainfall along with multiple storm rainfalls.
8. To study the effects of reservoir storage on runoff hydrograph.
9. To study the rainfall-runoff characteristics of an urban catchment.
10. To draw a drawdown curve for a single well in an unconfined aquifer pumping at a constant discharge.
11. To draw a drawdown curve for a single well in a confined aquifer pumping at a constant discharge.
12. To observe drawdown at the observation wells using water level indicator while investigating the pumping test of a tube well
13. Introduction and application of latest GIS software in hydrology.
14. To perform an Open-ended lab.

Recommended Books

1. Engineering Hydrology-An Introduction, Abdul Razzaq Ghumman, Abd ur Rehman Printers Islamabad
2. Hydrology for Engineers, R. K. Linsley, Max A. Kohler, and Joseph L. Paulhus McGraw-Hill Education (ISE Editions); Latest Edition.
3. Hydrology: Principles, Analysis and Design, H. M. Raghunath, New Age International Publishers, India, Latest Edition.

4. Introduction to Hydrology, Warren Viessman, Jr. and Gary L. Lewis, Prentice Hall, Latest Edition
5. A Textbook of Hydrology, Dr. P. Jaya Rami Reddy, University Science Press, India, Latest Edition.

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	Board of Studies	Res. No.2.4	Dated: 29/05/2024
	Board of Faculty	Res. No. 3.1	Dated: 19/08/2024
	Academic Council	Res. No.108.4(i)	Dated: 31-10-2024

Title of Course:	**:**	**Reinforced and Pre-stressed Concrete (2 + 1)**			
Course Code	**:**	CET302			
Semester	**:**	5th			
Technology	**:**	Civil Engineering Technology			
Effective	**:**	22 – Batch and onwards			
Pre-requisite	**:**	Nil			
Co-requisite	**:**	Nil			
Assessment	**:**	**Theory**		**Practical**	
	:	Quizzes/Test (s): 05 Marks Assignments/Projects/Presentations: 05 Marks Mid Semester Exam: 15 Marks Final Semester Exam: 25 Marks		Lab Rubrics: 30 % Open Ended Lab/Mini Project: 20 % Final Exam; Objective Test*: 30 % Final Exam; Conduct of Practical/Viva Voce*: 20 % *Appearance in Final Exams is mandatory	
Credit Hours/week	**:**	**Th**	2	**Pr**	1
Minimum Contact Hours	**:**	**Th**	32	**Pr**	3
Marks	**:**	**Th**	50	**Pr**	50

After Completing the Course, each student will be able to:

Sr. No.	Theory/ Practical	CLO	Taxonomy Level	PLO
1	Theory	**Describe** basic knowledge on design of reinforced and pre-stressed concrete structural members	C2	1
2	Theory	**Apply** design method for design of reinforced and pre-stressed concrete members using different codes.	C4	3
3	Practical	**Conduct** various laboratory and field experiments related to fresh/hardened reinforced and pre- stressed concrete.	P4	9
4	Practical	**Contribute** in team work considering the environmental impact, safety, and responsible use of resources in conduct of Lab and field experiments.	A2	9

Relevant Program Learning Outcomes (PLOs):
The course is designed so that students will achieve the following PLOs:

1	Engineering Technology Knowledge:	√	7	Environment and Sustainability:	
2	Problem Analysis:		8	Ethics:	
3	Design/Development of Solutions:	√	9	Individual and Team Work:	√

4	Investigation:		10	Communication:	
5	Modern Tool Usage:		11	Project Management:	
6	The Engineering Technologist & Society:		12	Lifelong Learning:	

OBJECTIVES:

- To understand basic knowledge on design of reinforced concrete structures.
- To be able to apply ultimate strength design method for design of reinforced concrete members using different international codes.

COURSE CONTENTS:

- **Reinforced concrete:**
  Basic principles of Reinforced concrete design, Basis for design and code constraints and associated assumptions, Design methods of reinforced concrete members, Basic concept of ultimate strength design method, Balanced, under reinforced and over reinforced section, Behavior of reinforced concrete members in flexure, Shear Stresses in Concrete Beams, Shear Cracking of Reinforced Concrete Beams, Web reinforcement, Behavior of Beams with web Reinforcement, Development Lengths for Tension Reinforcing, Development Lengths for Bundled Bars, Hooks, Bar cut off requirements, procedure for curtailment in continuous beams, development length with standard hooks, Preparation of working drawings of structural elements. Details of bar bending and preparation of schedules, Congested reinforcement and its placement techniques, provision of construction joint in flexural members and compression members, shapes of construction joints, Formwork and shuttering requirements, sizes, and types, shoring and scaffolding, advantages and disadvantages, design of formwork for RC members.

- **Prestressed Concrete**
  Basic concepts of prestressing, Methods of prestressing, Advantages and applications of prestressed concrete, Materials required for prestressed concrete, Analysis and assessment of prestressed concrete members based on stress and load balancing concept, short term and long-term deflections, Losses of prestress, Immediate and time dependents losses, lump sum and detailed estimation of prestress losses, Shapes of precast units, single tee, double tee, and hollow core-sections. Casting and curing of units. Typical joints for precast elements. Erection methods, precast units, and their specifications.

PRACTICAL WORK TO BE CARRIED OUT:

1. To determine the flexural strength of RCC concrete beams using centre-point loading method.
2. To determine the flexural strength of RCC concrete beams using third-point loading method.
3. Casting of reinforced concrete beam specimens and testing specimen for observation of flexural and shear cracks.
4. Making form work for precast concrete members and grills and casting of the specimens.
5. Study of equipment and machinery for pre-stressed concrete industry
6. Casting and testing of specimens of pre-stressed concrete units.

7. Casting and testing of specimens of precast RC concrete units.
8. Test for evaluation of structures (visual inspection and rebound hammer)
9. Open ended lab.

Recommended Books

1. Design of Concrete Structures by H. Nilson, McGraw- Hill.
2. Reinforced Concrete – Design & Behavior by C. K. Wang & Salmon.
3. Pre-stressed Concrete Structures by T. Y. Lin, Ned H. Burns, (Latest Edition).
4. PCI Design Handbook: Precast & Pre-stressed Concrete by Precast/Pre-stressed Concrete Institute, (Latest Edition).
5. Pre-stressed Concrete Design by Computer by R. Hulse, W.H. Mosley, (Latest Edition).

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	Board of Studies	Res. No.2.4	Dated: 29/05/2024
	Board of Faculty	Res. No. 3.1	Dated: 19/08/2024
	Academic Council	Res. No.108.4(i)	Dated: 31-10-2024

Title of Course:	**:**	**Construction Equipment and Job site Practices (2 + 1)**			
Course Code	**:**	CET303			
Semester	**:**	5th			
Technology	**:**	Civil Engineering Technology			
Effective	**:**	22 – Batch and onwards			
Pre-requisite	**:**	Nil			
Co-requisite	**:**	Nil			
Assessment	**:**	**Theory**		**Practical**	
	:	Quizzes/Test (s): 05 Marks Assignments/Projects/Presentations: 05 Marks Mid Semester Exam: 15 Marks Final Semester Exam: 25 Marks		Lab Rubrics: 30 % Open Ended Lab/Mini Project: 20 % Final Exam; Objective Test*: 30 % Final Exam; Conduct of Practical/Viva Voce*: 20 % *Appearance in Final Exams is mandatory	
Credit Hours/week	**:**	**Th**	2	**Pr**	1
Minimum Contact Hours	**:**	**Th**	32	**Pr**	3
Marks	**:**	**Th**	50	**Pr**	50

After Completing the Course, each student will be able to:

Sr. No.	Theory/ Practical	CLO	Taxonomy Level	PLO
1	Theory	**ANALYZE** Heavy construction equipment productivities	C4	2
2	Theory	**APPLY** Project Control Plans for effective site management.	C3	11
3	Practical	**CONDUCT** various experiments for estimation, layout planning, material management and onsite inspection (or video assisted) productivity studies.	P4	9
5	Practical	**CONTRIBUTE** in Lab and field assignments by understanding the value of teamwork and effective communication in job site practices.	A3	10

Relevant Program Learning Outcomes (PLOs):
The course is designed so that students will achieve the following PLOs:

1	Engineering Technology Knowledge:		7	Environment and Sustainability:	
2	Problem Analysis:	√	8	Ethics:	

3	Design/Development of Solutions:		9	Individual and Team Work:	√
4	Investigation:	√	10	Communication:	√
5	Modern Tool Usage:		11	Project Management:	√
6	The Engineering Technologist & Society:		12	Lifelong Learning:	

OBJECTIVES:

To apply equipment control plans for effective site management.

COURSE CONTENTS:

Construction Equipment: Brief Discussion on Use, Productivity of Equipment for Heavy Construction Operations, including; Tractors, Dozers, Scrapers, Motor Graders, Power Shovels, Off-Road Haulers, Front-End Loaders, Backhoes, Draglines, Trenchers, Rock Drilling Equipment, Crushers, Conveyors. Vertical concreting equipment; Crane and Bucket, Concrete Pumps, Concrete Conveyors, Pavement operations; concrete paving; asphalt paving; rehabilitating old pavement' Pile driving operations.

Jobsite Practices: Preparing Crew Assignments, review of submittals, shop drawings and samples, procurement schedule, subcontractor submittals, diaries log, accident reports, progress photographs, video-recordings, time-lapse photography, material logs, equipment logs, jobsite layout including; material and equipment handling, material storage, temporary facilities, jobsite security, fencing, access roads, job site tagging, projects in congested sites, labor organization and records, implementation of jobsite safety plan, cleaning and construction waste management, onsite material testing and inspection, implementation of environmental plan.

PRACTICAL WORK TO BE CARRIED OUT:

1. Onsite (or videorecording) productivity study of front shovel operations.
2. Onsite (or videorecording) productivity study of backhoe/excavator operations.
3. Onsite (or videorecording based analysis) productivity study of loader operations.
4. Onsite (or videorecording based analysis) productivity study of dragline operations.
5. Onsite (or videorecording based analysis) productivity and conduct study of dozer operations.
6. Concrete pump productivity
7. Pile load capacity calculation.
8. Estimating asphalt plant production.
9. Development of a jobsite layout for a real site.
10. Development of a time-lapse photographic jobs-site record.
11. Development of material tagging track and trace mechanism/system for a large construction project site.
12. Perform on-site quality inspections test for cement bags, aggregate, and steel etc.
13. Open ended lab.

Recommended Books

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Title of Course:	**:**	**Human Skills (2 + 0)**			
Course Code	**:**	CETH301			
Semester	**:**	5th			
Technology	**:**	Civil Engineering Technology			
Effective	**:**	22 – Batch and onwards			
Pre-requisite	**:**	Nil			
Co-requisite	**:**	Nil			
Assessment	**:**	**Theory**		**Practical**	
	:	Quizzes/Test (s): 05 Marks Assignments/Projects/Presentations: 05 Marks Mid Semester Exam: 15 Marks Final Semester Exam: 25 Marks		Lab Rubrics: 30 % Open Ended Lab/Mini Project : 20 % Final Exam; Objective Test*: 30 % Final Exam; Conduct of Practical/Viva Voce*: 20 % *Appearance in Final Exams is mandatory	
Credit Hours/week	**:**	**Th**	2	**Pr**	0
Minimum Contact Hours	**:**	**Th**	32	**Pr**	0
Marks	**:**	**Th**	50	**Pr**	0

After Completing the Course, each student will be able to:

Sr. No.	Theory/ Practical	CLO	Taxonomy Level	PLO
1	Theory	**EXPLAIN** required skills of career foresightedness and relationship building	C3	10
2	Theory	**DEMONSTRATE** productivity improvement, empowerment skills, mobility and engagement	C3	8

Relevant Program Learning Outcomes (PLOs):
The course is designed so that students will achieve the following PLOs:

1	Engineering Technology Knowledge:		7	Environment and Sustainability:	
2	Problem Analysis:		8	Ethics:	√
3	Design/Development of Solutions:		9	Individual and Team Work:	
4	Investigation:		10	Communication:	√
5	Modern Tool Usage:		11	Project Management:	

6	The Engineering Technologist & Society:		12	Lifelong Learning:	

OBJECTIVES:

To have the knowledge of career foresightedness, relationship building, productivity improvement, empowerment skills, teamwork, mobility and engagement.

COURSE CONTENTS:

Career Foresightedness

Understanding Career Growth Patterns in Technology Domain, Identifying Gaps in Personal and Professional Competence, Making Right Career Choices and Developing a Career Plan, Persistence and Continuous Improvement; Learning, Unlearning and Relearning

Productivity Improvement

Time Management, Creative Problem Solving, Critical Thinking, Goal Setting and Getting Things Done, Personal Performance Management and Achieving Excellence

Relationship Building

Emotional Intelligence, Negotiation Skills, Body Language Basics, Professional Etiquette, Conflict Resolution, Interpersonal Skills, Managing Cultural Diversity, Networking, Using Social Media Effectively

Empowerment Domain

Vision and Strategic Thinking, Ethics and Value System, Leadership and Influence, Assertiveness, Using Mentorship, Taking Initiative, Becoming a Change Agent and Leading Change, Developing and Sustaining a Positive Attitude

Mobility and Engagement

Teamwork and Coordination Skills, Kaizen and Lean Mindset, Value Chain Approach to Problem Solving, Creating a Win-Win Situation and Developing a Business Case

Recommended Books

1. Various Handouts, Reading Materials, cases and exercises to be used to cover the various aspects of the course.
2. People Skills for Engineers, Tony Munson, Kindle Store publishers, 2018.
3. Advances in the Human Side of Service Engineering, Published October 23, 2019 by CRC Press

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	Academic Council	Res. No.108.4(i)	Dated: 31-10-2024

Subject	**:**	**Construction Planning and Management (1+1)**			
Course Code	**:**	CETM301			
Semester	**:**	5th			
Technology	**:**	Civil Engineering Technology			
Effective	**:**	22 – Batch and onwards			
Pre-requisite	**:**	Nil			
Co-requisite	**:**	Nil			
Assessment	**:**	**Theory**		**Practical**	
	:	Quizzes/Test (s): 05 Marks Assignments/Projects/Presentations: 05 Marks Mid Semester Exam: 15 Marks Final Semester Exam: 25 Marks		Lab Rubrics: 30 % Open Ended Lab/Mini Project : 20 % Final Exam; Objective Test*: 30 % Final Exam; Conduct of Practical/Viva Voce*: 20 % *Appearance in Final Exams is mandatory	
Credit Hours/week	**:**	**Th**	1	**Pr**	1
Minimum Contact Hours	**:**	**Th**	16	**Pr**	48
Marks	**:**	**Th**	50	**Pr**	50

After Completing the Course, each student will be able to:

Sr. No.	Theory/ Practical	CLO	Taxonomy Level	PLO
1	Theory	**DESCRIBE** primary theoretical knowledge of construction management in the field of civil engineering technology	C2	11
2	Theory	**APPLY** the knowledge of deterministic and probabilistic models for project planning and scheduling.	C3	11
3	Practical	**PERFORM** practical related to planning and scheduling using relevant software.	P3	3

Relevant Program Learning Outcomes (PLOs):
The course is designed so that students will achieve the following PLOs:

1	Engineering Technology Knowledge:		7	Environment and Sustainability:	
2	Problem Analysis:		8	Ethics:	
3	Design/Development of Solutions:	√	9	Individual and Team Work:	
4	Investigation:		10	Communication:	
5	Modern Tool Usage:		11	Project Management:	√

6	The Engineering Technologist & Society:		12	Lifelong Learning:	

OBJECTIVES:

To apply the knowledge of deterministic and probabilistic models for project planning and scheduling.

COURSE CONTENTS:

Basic concepts of project management, Funcations and dials of project management, Construction Project Management, Introduction and overview of the subject, Objectives of Management, Levels of Management, Organizational Hirecarchy. Project Roles, Responsibilities & Skills of Project Manager, Identification of Project, Preparation and approval procedure of PC-1, PC-II, PC-III & PC-IV, Project design, project development and project documentation, Project Life Cycle, SWOT analysis, PEST analysis and PESTLE analysis, Feasibility studies of the Project, Procurement process, contractual relationship & contract types, terms and conditions of contract, conditions of contracts, Project **Project Planning, Scheduling and Controlling:** Deterministic Models: Construction activities, Work Break Down Structure (WBS), Gantt chart, Planning and Scheduling by using different Network Techniques, Activity on Arrow Diagram Method (AOA), Activity on Node Diagram Method (AON), Critical Path Method (CPM), Precedence Diagram Method (P.D.M.),

RACTICAL WORK TO BE CARRIED OUT:

Practical will be based on Theory.

Recommended Books

Approval:	Industrial Advisory Board	Res No. 9.5	Dated: 09/05/2024
	Board of Studies	Res. No.2.4	Dated: 29/05/2024
	Board of Faculty	Res. No. 3.1	Dated: 19/08/2024
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Title of Course:	**:**	**Electro-mechanical Technology (2 + 0)**			
Course Code	**:**	CET304			
Semester	**:**	5th			
Technology	**:**	Civil Engineering Technology			
Effective	**:**	22 – Batch and onwards			
Pre-requisite	**:**	Nil			
Co-requisite	**:**	Nil			
Assessment	**:**	**Theory**		**Practical**	
	:	Quizzes/Test (s): 05 Marks Assignments/Projects/Presentations: 05 Marks Mid Semester Exam: 15 Marks Final Semester Exam: 25 Marks		-	
Credit Hours/week	**:**	**Th**	2	**Pr**	0
Minimum Contact Hours	**:**	**Th**	32	**Pr**	0
Marks	**:**	**Th**	50	**Pr**	0

After Completing the Course, each student will be able to:

Sr. No.	Theory/ Practical	CLO	Taxonomy Level	PLO
1	Theory	**Understand** construction and working principles of capacitors, batteries, diodes, and transistors	C2	1
2	Theory	**Apply** various energy conversion systems used in thermodynamics equipment.	C3	2

Relevant Program Learning Outcomes (PLOs):
The course is designed so that students will achieve the following PLOs:

1	Engineering Technology Knowledge:	√	7	Environment and Sustainability:	
2	Problem Analysis:	√	8	Ethics:	
3	Design/Development of Solutions:		9	Individual and Team Work:	
4	Investigation:		10	Communication:	
5	Modern Tool Usage:		11	Project Management:	
6	The Engineering Technologist & Society:		12	Lifelong Learning:	

OBJECTIVES:

To understand the construction and working principles of capacitors, batteries, diodes, and transistors

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COURSE CONTENTS:

Part-1

Electrostatic: Concept of Electric filed. Equipotential surfaces. Permittivity. Electric stress, stored energy, motion of a charged particle in a uniform electrostatics field, calculation of capacitance.
Electromagnetism: Concept of magnetic field Permissibility, magnetic properties of ferromagnetic materials. The magnetic circuit. Generation of EMF, Faraday's of laws of electromagnetic induction.
Electric Circuit: Resistivity, Ohm's Law, Kerchief's laws, Simple D.C network problems, Temperature coefficient.
Alternating currents: Mean and RMS values, The effects of resistances, inductance and capacitance in an AA, Circuit, vertical representation power and power factor.
Secondary Batteries: Types construction, charging and discharging rate, efficiency, care and maintenance. Transformers: The magnetic circuit of transformers, Transformation ratio, voltage, current and power relationships. Electronics: Diode, transistors, and simple rectifier circuits.

Part-2

Introduction, gases and vapors, contents volume and pressure, PV diagram specific heat of gases and vapors. Laws of Boyle, Charles, Avogadro, Dalton. The two laws of thermodynamics. Heating of gases ,adiabatic expansion, expansion curves, cycles of operation,
A.S.E of cycle, reversibility, Carnot cycle sterling and Erickson Cycle, Joule, Otto and diesel cycle, Heat transformation into work, TS diagram, Heating of gas at constant volume and pressure. General case of change of entropy, Air compressor, Single stage compressor, volumetric efficiency formation of steam, Enthalpy of water and steam, Use of steam tables, Volume of super-heated steam, Introduction to IC engines, Classification and working cycle injection and ignition of fuel. Governing of IC engine volumetric efficiency and performance

Recommended Books

1. electrical technology, BL Theraja, 18th edition, McGraw Hill Book Company Electrical technology, H.U Ghes, 17th edition Knson Education Asian
2. Basic Electrical Engineering Science, Mc Kenzie Smith, ELBS edition Applied thermodynamics, Ryner Joel, Mc Graw Hill Company

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