



# **GOVERNMENT COLLEGE OF TECHNOLOGY**

(An Autonomous Institution Affiliated to Anna University)

Coimbatore - 641 013

**Curriculum & Syllabi**

**B. E. CIVIL ENGINEERING**

**(Working Professionals)**

# **2025**

## **Regulations**

**OFFICE OF THE CONTROLLER OF EXAMINATIONS**

**GOVERNMENT COLLEGE OF TECHNOLOGY**

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**GOVERNMENT COLLEGE OF TECHNOLOGY, COIMBATORE – 641 013****B.E. CIVIL ENGINEERING - (Working Professionals)****2025 REGULATIONS****(Candidates admitted during 2025-2026 and onwards)****FIRST SEMESTER**

Sl. No.	Course Code	Course Title	CA Marks	End Sem Marks	Total Marks	Hours/Week			
						L	T	P	C
THEORY									
1	25WPC1Z1	Applied Mathematics I (Common to Mech, EEE & ECE)	40	60	100	3	0	0	3
2	25WPC1Z2	Environmental Science and Engineering (Common to Mech, EEE & ECE)	40	60	100	3	0	0	3
3	25WPC103	Engineering Mechanics	40	60	100	3	0	0	3
4	25WPC104	Fluid Mechanics and Machinery	40	60	100	3	0	0	3
PRACTICAL									
5	25WPC105	Fluid Mechanics and Machinery Laboratory	60	40	100	0	0	3	1.5
TOTAL			220	280	500	12	0	3	13.5

<b>25WPC1Z1</b>	<b>APPLIED MATHEMATICS I</b> (Common to MECH, EEE & ECE Branches)	<b>SEMESTER I</b>
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PREREQUISITES		L	T	P	C
NIL		3	0	0	3
Course Objectives	This course mainly deals with topics such as linear algebra, single variable calculus and numerical methods and plays an important role in the understanding of engineering science.				
UNIT – I	LINEAR ALGEBRA	9 Periods			
Consistency of System of Linear Equations, Eigenvalues and eigenvectors, Diagonalization of matrices by orthogonal transformation, Cayley-Hamilton Theorem, Quadratic form to canonical forms.					
UNIT – II	DIFFERENTIAL CALCULUS	9 Periods			
Radius of curvature, Centre of curvature, Circle of curvature , Evolutes of a curve, Envelopes					
UNIT – III	INTEGRAL CALCULUS	9 Periods			
Evaluation of definite and improper integrals, Applications: surface area and volume of revolution (Cartesian coordinates only).					
UNIT – IV	NUMERICAL SOLUTION OF EQUATIONS	9 Periods			
Algebraic and Transcendental equation: Fixed point iteration method, Bisection method, Newton-Raphson method, Simultaneous equation: Gauss elimination method, Gauss-Jordan method, Gauss Seidal method.					
UNIT – V	NUMERICAL INTERPOLATION	9 Periods			
Equal interval: Newton’s forward and Backward difference interpolation formulae, Gauss forward and Backward difference interpolation formulae, Unequal interval: Lagrange’s interpolation, Newton’s divided difference interpolation.					
Contact Periods:					
Lecture: 45 Periods      Tutorial: 0 Periods      Practical: 0 Periods      Total: 45 Periods					

## TEXT BOOK

1	Veerarajan T., <i>Engineering Mathematics I</i> , Tata McGraw-Hill Education(India) Pvt. Ltd, New Delhi, 1 <sup>st</sup> edition 2017.
2	P. Kandasamy, K. Thilagavathy, K. Gunavathi, <i>Numerical Methods</i> , S. Chand & Company, 3 <sup>rd</sup> Edition, Reprint 2013.

## REFERENCES

1	B.S.Grewal, <i>Higher Engineering Mathematics</i> , Khanna Publishers, 44 <sup>th</sup> Edition, 2021.
2	David C.Lay, <i>Linear Algebra and its Application</i> , Pearson Publishers, 6 <sup>th</sup> Edition, 2021.
3	Howard Anton, <i>Elementary Linear Algebra</i> , 11 <sup>th</sup> Edition, Wiley Publication, 2013.
4	Narayanan.S and Manicavachagom Pillai. T.K. – <i>Calculus Vol I and Vol II</i> , S.chand & Co, 6 <sup>th</sup> Edition, 2016.
5	S.S. Sastry, <i>Introductory methods of numerical analysis</i> , PHI, New Delhi, 5 <sup>th</sup> Edition, 2015.
6	Ward Cheney, David Kincaid, <i>Numerical Methods and Computing</i> , Cengage Learning, Delhi, 7 <sup>th</sup> Edition 2013.
7	Jain R.K. and Iyengar S.R.K., - <i>Advanced Engineering Mathematics</i> , Narosa Publications, 8 <sup>th</sup> Edition, 2012.

<b>COURSE OUTCOMES:</b>		<b>Bloom's Taxonomy Mapped</b>
Upon completion of the course, the students will be able to:		
CO1	Use the essential tool of matrices and linear algebra in a comprehensive manner.	K3
CO2	Explain the fallouts of circle of curvature, evolute and envelopes that is fundamental to application of analysis to Engineering problems.	K3
CO3	Interpret the integral calculus to notions of definite and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.	K3
CO4	Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to polynomial and transcendental equations.	K3
CO5	Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations.	K3

<b>25WPC1Z2</b>	<b>ENVIRONMENTAL SCIENCE AND ENGINEERING</b> (Common to MECH, EEE & ECE Branches)	<b>SEMESTER I</b>
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<b>PREREQUISITES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>NIL</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>Course Objectives</b>	The course is aimed at creating awareness among the students and also inculcates the critical ideas of preserving environment.		
<b>UNIT – I</b>	<b>ENVIRONMENTAL ENERGY RESOURCES</b>	<b>9 Periods</b>	
Food-effects of modern agriculture, fertilizers, pesticides, eutrophication & biomagnifications-Energy resources: renewable resources - Hydro Energy, Solar & Wind. Non-renewable resources – Coal and Petroleum - harnessing methods.			
<b>UNIT – II</b>	<b>ECO SYSTEM AND BIODIVERSITY</b>	<b>9 Periods</b>	
Eco system and its components - biotic and abiotic components. Biodiversity: types and values of biodiversity, hot spots of biodiversity, endangered and endemic species, conservation of biodiversity: In situ and ex situ conservation. Threats to biodiversity-destruction of habitat, habitat fragmentation, hunting, over exploitation and man-wildlife conflicts. The IUCN red list categories.			
<b>UNIT – III</b>	<b>ENVIRONMENTAL POLLUTION</b>	<b>9 Periods</b>	
Air pollution, classification of air pollutants – sources, effects and control of gaseous pollutants SO <sub>2</sub> , NO <sub>2</sub> , H <sub>2</sub> S, CO, CO <sub>2</sub> and particulates. Water pollution - classification of water pollutants, organic and inorganic pollutants, sources, effects and control of water pollution. Noise pollution - decibel scale, sources, effects and control.			
<b>UNIT – IV</b>	<b>ENVIRONMENTAL THREATS</b>	<b>9 Periods</b>	
Global warming-measure to check global warming - impacts of enhanced Greenhouse effect, Acid rain- effects and control of acid rain, ozone layer depletion- effects of ozone depletion, disaster management - flood, drought, earthquake and tsunامي.			
<b>UNIT – V</b>	<b>SOCIAL ISSUES AND ENVIRONMENT</b>	<b>9 Periods</b>	
Water conservation, rain water harvesting, e-waste management, Pollution Control Act, Wild life Protection Act. Population growth- exponential and logistic growth, variation in population among nations, population policy. Women and Child welfare programs. Role of information technology in human and health, COVID-19 - effects and preventive measures.			
<b>Contact Periods:</b>			
<b>Lecture:45 Periods</b>		<b>Tutorial: 0 Periods</b>	<b>Practical: 0 Periods</b>
		<b>Total:45 Periods</b>	

**TEXT BOOK:**

1	Sharma J.P., “ <i>Environmental Studies</i> ”, 4 <sup>th</sup> Edition, University Science Press, New Delhi, 2016.
2	Anubha Kaushik and C.P.Kaushik, “ <i>Environmental Science and Engineering</i> ”, 7 <sup>th</sup> Edition, New age international publishers, New Delhi, 2021.

**REFERENCES:**

1	A k de, “ <i>Environmental Chemistry</i> ”, 8 <sup>th</sup> edition, New age international publishers, 2017.
2	G. Tyler miller and scott e. Spoolman, “ <i>Environmental Science</i> ”, cengage learning india pvt. Ltd., delhi, 2014.
3	Erach Bharucha, “ <i>Textbook of Environmental Studies</i> ”, Universities press (I) pvt, Ltd., Hydrabad, 2015.
4	Gilbert M. Masters, “ <i>Introduction to Environmental Engineering and Science</i> ”, 3 <sup>rd</sup> Edition, Pearson Education, 2015.

<b>COURSE OUTCOMES:</b>		<b>Bloom's Taxonomy Mapped</b>
Upon completion of the course, the students will be able to:		
CO1	Recognize and understand about the various environmental energy resources and the effective utility of modern agriculture.	K2
CO2	Acquire knowledge about the interaction of biosphere with environment and conservation methods of bio diversity.	K2
CO3	Be aware of the sources of various types of pollution, their ill effects and preventive methods.	K2
CO4	Identify and take the preventive measures to control the environmental threats and effects of Global warming, Ozone depletion, Acid rain, and natural disasters.	K2
CO5	Demonstrate an idea to save water and other issues like COVID -19.	K2

<b>25WPC103</b>	<b>ENGINEERING MECHANICS</b>	<b>SEMESTER I</b>
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<b>PREREQUISITES :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>NIL</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>Course Objectives</b>	To expose the students to use the basic principles of mechanics in engineering applications.		
<b>UNIT – I</b>	<b>BASIC CONCEPTS OF FORCES</b>	<b>9 Periods</b>	
Basic Concepts and Principles of Forces– Laws of Mechanics – System of forces in Plane – Free body Diagrams- resultant of a force system – resolution and composition of forces – Lami’s theorem – moment of a force – physical significance of moment-Varignon’s theorem – resolution of a force and couple system– forces in space – addition of concurrent forces in space – equilibrium of a particle in space.			
<b>UNIT – II</b>	<b>STATIC AND DYNAMIC FRICTION</b>	<b>9 Periods</b>	
Frictional resistance – classification of friction- laws of friction – coefficient of friction-angle of friction – angle of repose — cone of friction –advantages-equilibrium of a body on a rough inclined plane – ladder friction – rope friction – wedge friction.			
<b>UNIT – III</b>	<b>PROPERTIES OF SECTION</b>	<b>9 Periods</b>	
Centroid and Centre of Gravity for simple & Composite sections– theorems of moment of inertia Determination of moment of inertia of various sections –Product of Inertia – Principal moment of inertia of plane areas.			
<b>UNIT – IV</b>	<b>BASICS OF DYNAMICS - KINEMATICS</b>	<b>9 Periods</b>	
Kinematics and kinetics – displacements, velocity and acceleration - Equations of motion – Rectilinear motion of a particle with uniform velocity, uniform acceleration, varying acceleration– motion under gravity – relative motion – curvilinear motion of particles – projectiles– angle of projection – range – time of flight and maximum height.			
<b>UNIT – V</b>	<b>BASICS OF DYNAMICS - KINETICS</b>	<b>9 Periods</b>	
Newton’s second law of motion – linear momentum – D’Alembert’s principle, Dynamic equilibrium – equation of particles- principle of work and energy – law of conservation of energy – Principle of impulse and momentum – Equations of momentum – Laws of conservation of momentum. Impact – Time of compression, restitution, collision – Co-efficient of restitution – types of impact – collision of elastic bodies by direct central impact and oblique impact – collision of small body with a massive body – Kinetic energy of a particle.			
<b>Contact Periods:</b>			
<b>Lecture: 45 Periods      Tutorial: 0 Periods      Practical: 0 Periods      Total: 45 Periods</b>			

**Text Book:**

1	<i>F.B. Beer and E.R. Johnson, “Vector Mechanics for Engineers”, Tata Mc.Graw Hill Pvt Ltd, 11<sup>th</sup> Edition, 2013.</i>
2	<i>Rajasekaran S &amp;Sankara Subramanian, “Fundamentals of Engineering Mechanics”, Vikas Publishing House Pvt Ltd. 3<sup>rd</sup> Edition, 2017.</i>

**REFERENCES:**

1	<i>S. Timoshenko and Young, “Engineering Mechanics”, McGraw Hill, 4<sup>th</sup> Edition, 2017.</i>
2	<i>Bansal R.K, “A Text Book of Engineering Mechanics”, Laxmi Publications, 2015.</i>
3	<i>R.C. Hibbeller, “Engineering Mechanics”, Prentice Hall of India Ltd, 14<sup>th</sup> Edition, 2017.</i>
4	<i>Dr.N.Kottiswaran“Engineering Mechanics”Sri Balaji Publications,2017.</i>

<b>COURSE OUTCOMES:</b>		<b>Bloom's Taxonomy Mapped</b>
Upon completion of the course, the students will be able to:		
CO1	Familiarize the principles and Concepts of Mechanics	K3
CO2	Calculate the friction force acting on a plane under various conditions.	K2
CO3	Determine the centre of gravity and moment of inertia for different sections.	K2
CO4	Predict the Rectilinear and curvilinear motion of particles.	K3
CO5	Evaluate the dynamics of particles using kinetic principles.	K3



<b>25WPC104</b>	<b>FLUID MECHANICS AND MACHINERY</b>	<b>SEMESTER I</b>
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PREREQUISITES		L	T	P	C
NIL		3	0	0	3
Course Objectives	To impart knowledge on properties and behaviour of fluid at static and dynamic conditions and also study the performance of turbines and pumps				
UNIT – I	FUNDAMENTALS OF FLUID STATICS	9 Periods			
Dimensions and Units - Properties of fluids - Density, specific gravity, viscosity, surface tension, capillarity, elasticity, compressibility, vapour Pressure - Fluid statics – Pascal’s Law - Pressure measurement - Piezometer and Manometers – Hydrostatic forces on plane and curved surfaces					
UNIT – II	FLUID KINEMATICS AND DYNAMICS	9 Periods			
Classification of fluid flow – Continuity equation - one dimensional and three dimensional –Velocity potential and stream functions - Energy equation – Euler’s and Bernoulli’s equation – Applications - Venturimeter, Orifice meter and Pitot tube					
UNIT – III	FLOW THROUGH CONDUITS AND BOUNDARY LAYER THEORY	9 Periods			
Laminar flow between parallel plates – laminar flow in pipes - Hagen Poiseuille equation for flow through circular pipes - Turbulent flow in pipes – Darcy - Weisbach formula for flow through circular pipes - Boundary layer - Definition - Boundary layer thickness - Displacement, energy and momentum thickness					
UNIT – IV	IMPACT OF JETS AND PUMPS	9 Periods			
Impulse momentum Principle- impact of Jet – force exerted by a jet on normal, inclined and curved surfaces for stationary and moving vanes- Angular momentum principle- construction of velocity vector diagrams. Pump- Classification of pumps - Centrifugal pump - reciprocating pump – Work done and efficiency					
UNIT – V	HYDRAULIC TURBINES	9 Periods			
Turbines - classification – construction – working principles and design of Pelton wheel and Francis Turbines – wok done and efficiency – specific speed – operating characteristics.					
Contact Periods:					
Lecture: 45 Periods		Tutorial: 0 Periods		Practical: 0 Periods	
Total: 45 Periods					

#### TEXT BOOKS :

1	<i>P.N.Modi and S.M.Seth, “Hydraulics and Fluid Mechanics, Including Hydraulic Machines”, Standard Book House, New Delhi, 2019.</i>
2	<i>R.K.Bansal, “Fluid Mechanics and Hydraulic Machines”, Laxmi Publications (P) Ltd., New Delhi, 2018.</i>

#### REFERENCES :

1	<i>R.K.Rajput, “A Text Book of Fluid Mechanics and Hydraulic Machines”, S.Chand and Company, New Delhi, 2015.</i>
2	<i>K.L.Kumar, “Engineering Fluid Mechanics”, Eurasia Publishing House (P) Ltd., New Delhi, 2018.</i>
3	<i>Jagdish Lal, “Fluid Mechanics &amp; Hydraulic With Computer Applications”, Tata McGraw Hill, New Delhi, 2008.</i>

4	M.K.Natarajan “ <b>Principles of Fluid Mechanics</b> ”, Anuradha Agencies, VidayalKaruppur, Kumbakonam, 2008.
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<b>COURSE OUTCOMES:</b>		<b>Bloom's Taxonomy Mapped</b>
Upon completion of the course, the students will be able to:		
CO1	Identify the properties of fluids and fluid statics.	K2
CO2	Apply the continuity equation, Euler's equation and Bernoulli's equation for solving fluid flow problems.	K3
CO3	Examine the fluid flow behaviour for laminar and turbulent flows and also determine boundary layer thickness	K3
CO4	Apply the momentum principle for the determination of hydrodynamic forces	K3
CO5	Acquire knowledge in selection and design of turbines based on head and discharge requirements.	K3

25WPC105	FLUID MECHANICS AND MACHINERY LABORATORY	SEMESTER I
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PREREQUISITES	L	T	P	C
NIL	0	0	3	1.5

<b>Course Objectives</b>	To impart knowledge in solving problems occurring in a pipes due to losses, the verification of bernoulli's theorem and its applications and conducting performance tests on different types of pumps and turbines.
<b>LIST OF EXPERIMENTS:</b> <ol style="list-style-type: none"> <li>1. Determination of Darcy's friction factor</li> <li>2. Verification of Bernoulli's Theorem</li> <li>3. Determination of coefficient of discharge of Venturimeter / Orifice meter</li> <li>4. Flow over Notches</li> <li>5. Flow through Mouthpiece</li> <li>6. Performance Study of Centrifugal pump</li> <li>7. Performance Study of reciprocating pump</li> <li>8. Load test on Pelton wheel</li> <li>9. Load test on Francis turbine</li> </ol>	

**Contact Periods:**

**Lecture: 0 Periods      Tutorial: 0 Periods      Practical: 45 Periods      Total: 45 Periods**

COURSE OUTCOMES:		Bloom's Taxonomy Mapped
Upon completion of the course, the students will be able to:		
CO1	Solve different problems in pipes due to losses.	K3
CO2	Verify the Bernoulli's theorem and its applications.	K3
CO3	Can carry out flow measurement through notches	K3
CO4	Do performance tests on different types of pumps.	K3
CO5	Do performance tests on different types of turbines.	K3