GOVERNMENT COLLEGE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University)

Coimbatore - 641 013

Curriculum For

B. E. Civil Engineering

(Part Time)

2023

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 - PART TIME

2023 REGULATIONS - CURRICULUM

(Part Time Candidates admitted during 2023-2024 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	23PTC1Z1	Applied Mathematics – I *(Common to CIVIL,MECH,EEE,ECE)*	40	60	100	3	0	0	3
2	23PTC1Z2	Environmental Science and Engineering *(Common to CIVIL, MECH, EEE, ECE)*	40	60	100	3	0	0	3
3	23PTC103	Engineering Mechanics	40	60	100	3	0	0	3
4	23PTC104	Fluids Mechanics and Machinery *(Common to CIVIL &MECH)*	40	60	100	3	0	0	3
PRACTICAL									
5	23PTC105	Fluid Machines Laboratory	60	40	100	0	0	3	1.5
		TOTAL			**500**				**13.5**

23PTC1Z1	APPLIED MATHEMATICS - I *(Common to CIVIL, MECH, EEE, ECE Branches)*	SEMESTER I			
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: 60 Periods**					

TEXT BOOK

1	*VeerarajanT., **"Engineering Mathematics I"**, Tata McGraw-Hill Education(India)Pvt. Ltd, New Delhi,2015.*
2	*P. Kandasamy, K. Thilagavathy, K. Gunavathi, **"Numerical Methods"**, S. Chand & Company, 3rd Edition, Reprint 2013.*

REFERENCES

1	*B.S.Grewal, **"Higher Engineering Mathematics"**, Khanna Publishers, 44th Edition, 2017.*
2	*David C.Lay, **"Linear Algebra and Its Application"**, Pearson Publishers, 6th Edition, 2021.*
3	*Howard Anton, **"Elementry Linear Algebra"**, 11th Edition, Wiley Publication, 2013.*
4	*Narayanan.S and Manicavachagom Pillai. T.K. – **"Calculas Vol I and Vol II",** S.chand & Co, Sixth Edition, 2014.*
5	*S.S. Sastry, **"Introductory methods of numerical analysis"**, PHI, New Delhi, 5th Edition, 2015.*
6	*Ward Cheney, David Kincaid, **"Numerical Methods and Computing",** Cengage Learning**,** Delhi, 7th Edition 2013.*
7	*Jain R.K. and Iyengar S.R.K., - **"Advanced Engineering Mathematics"**, Narosa Publicaitons, Eighth Edition, 2012.*

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
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 envelops 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

COURSE ARTICULATION MATRIX

a) CO and PO Mapping

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO2	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO3	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO4	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO5	3	3	2	2	-	-	-	-	-	-	-	2	-	1
23PTC1Z1	3	3	2	2	-	-	-	-	-	-	-	2	-	1

1 – Slight, 2 – Moderate, 3 – Substantial

b) CO and Key Performance Indicators Mapping

CO1	1.1.1, 1.1.2, 2.1.1, 2.1.3, 2.2.3, 2.3.1, 2.3.2, 2.4.1, 2.4.3, 2.4.4, 2.4.4, 12.2.1
CO2	1.1.1, 1.1.2, 2.1.1, 2.1.3, 2.2.3, 2.3.1, 2.3.2, 2.4.1, 2.4.3, 2.4.4, 2.4.4, 12.2.1
CO3	1.1.1, 1.1.2, 2.1.1, 2.1.3, 2.2.3, 2.3.1, 2.3.2, 2.4.1, 2.4.3, 2.4.4, 2.4.4, 12.2.1
CO4	1.1.1, 1.1.2, 2.1.1, 2.1.3, 2.2.3, 2.3.1, 2.3.2, 2.4.1, 2.4.3, 2.4.4, 2.4.4, 12.2.1
CO5	1.1.1, 1.1.2, 2.1.1, 2.1.3, 2.2.3, 2.3.1, 2.3.2, 2.4.1, 2.4.3, 2.4.4, 2.4.4, 12.2.1

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	50	30	-	-	-	100
CAT2	20	50	30	-	-	-	100
Individual Assignment1 /Case Study1 /Seminar 1 /Project 1	20	50	30	-	-	-	100
Individual Assignment2 /Case Study2 /Seminar 2 /Project 2	20	50	30	-	-	-	100
ESE	20	50	30	-	-	-	100

22PTC1Z2	ENVIRONMENTAL SCIENCE AND ENGINEEREING *(Common to CIVIL, MECH, EEE, ECE)*	SEMESTER I

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	The course is aimed at creating awareness among the students and also inseminates the critical ideas of preserving environment.

UNIT – I	ENVIRONMENTAL ENERGY RESOURCES	9 Periods

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.

UNIT – II	ECO SYSTEM AND BIODIVERSITY	9 Periods

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, habit fragmentation, hunting, over exploitation and man-wildlife conflicts. The IUCN red list categories.

UNIT – III	ENVIRONMENTAL POLLUTION	9 Periods

Air pollution, classification of air pollutants – sources, effects and control of gaseous pollutants SO_2, NO_2, H_2S, CO, CO_2 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.

UNIT – IV	ENVIRONMENTAL THREATS	9 Periods

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 tsunami.

UNIT – V	SOCIAL ISSUES AND ENVIRONMENT	9 Periods

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.

Contact Periods:

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

TEXT BOOK:

1	*Sharma J.P., **"Environmental Studies"**, 4th Edition, University Science Press, New Delhi 2016.*
2	*AnubhaKaushik and C.P.Kaushik**, "Environmental Science and Engineering"**, 7th Edition, New age International Publishers, New Delhi, 2021.*

REFERENCES:

1	*A k de, **"Environmental Chemistry"**, eight edition, new age international publishers, 2017.*
2	*G. Tyler miller and scott e. Spoolman, **"Environmental Science"**, cengage learning indiapvt, ltd, delhi, 2014.*
3	*ErachBharucha, **"Textbook of Environmental Studies"**, Universities Press(I) Pvt, Ltd, Hydrabad, 2015.*
4	*Gilbert M.Masters**, "Introduction to Environmental Engineering and Science"**, 3rd Edition, Pearson Education, 2015.*

COURSE OUTCOMES: upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
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

COURSE ARTICULATION MATRIX

COs/ POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	1	-	-	-	-	1	-	-	-	-	-	1	-
CO2	1	1	-	-	-	-	1	-	-	-	-	-	1	-
CO3	2	1	-	-	-	-	1	-	-	-	-	-	1	-
CO4	2	2	1	-	-	-	1	-	-	-	-	-	1	-
CO5	2	2	1	-	-	-	1	-	-	-	-	-	1	-
22PTC1Z2	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**

1 – Slight, 2 – Moderate, 3 – Substantial

23PTC103	ENGINEERING MECHANICS	SEMESTER I			
PREREQUISITES :		**L**	**T**	**P**	**C**
NIL		**3**	**0**	**0**	**3**
Course Objectives	To expose the students to use the basic principles of mechanics in engineering applications.				
UNIT – I	**BASIC CONCEPTS OF FORCES**				**9 Periods**
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.					
UNIT – II	**STATIC AND DYNAMIC FRICTION**				**9 Periods**
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.					
UNIT – III	**PROPERTIES OF SECTION**				**9 Periods**
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.					
UNIT – IV	**BASICS OF DYNAMICS - KINEMATICS**				**9 Periods**
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.					
UNIT – V	**BASICS OF DYNAMICS - KINETICS**				**9 Periods**
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.					
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**					

TEXT BOOK:

1	*F.B. Beer and E.R. Johnson, **"Vector Mechanics for Engineers"**, Tata Mc.Graw Hill Pvt Ltd,11th Edition, 2013.*
2	*Rajasekaran S & Sankara Subramanian, **"Fundamentals of Engineering Mechanics"**, Vikas Publishing House Pvt Ltd. 3rd Edition, 2017.*

REFERENCES:

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

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
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

COURSE ARTICULATION MATRIX:

CO and PO Mapping															
COs/ POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	-	-	2	-	-	-	-	-	-	1	2	2
CO2	3	2	1	-	-	2	-	-	-	-	-	1	-	2	3
CO3	3	3	1	-	-	2	-	-	-	-	-	-	-	2	3
CO4	3	3	1	-	-	2	-	-	-	-	-	1	1	2	3
CO5	3	3	1	-	-	2	-	-	-	-	-	1	1	2	3
23PTC103	3	3	1	-	-	2	-	-	-	-	-	1	1	2	3
1 – Slight, 2 – Moderate, 3 – Substantial															

23PTC104	FLUID MECHANICS AND MACHINERY	SEMESTER I

PREREQUISITES	CATEGORY	L	T	P	C
NIL	ES	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	**BASIC CONCEPTS AND 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 CONCEPT**	**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	**MOMENTUM PRINCIPLE**	**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

UNIT – V	**HYDRAULIC TURBINES AND PUMPS**	**9 Periods**

Turbines - classification – construction – working principles and design of Pelton wheel and Francis Turbines – wok done and efficiency – specific speed – operating characteristics – Classification of pumps - Centrifugal pump - Work done and Efficiency

Contact Periods:

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

TEXT BOOKS:

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

REFERENCES:

1	*R.K.Rajput, **"A Text Book of Fluid Mechanics and Hydraulic Machines",** S.Chand and Company, New Delhi, 2015.*
2	*K.L.Kumar, **"Engineering Fluid Mechanics",** Eurasia Publishing House (P) Ltd., New Delhi, 2018.*
3	*Jagdish Lal, **"Fluid Mechanics & Hydraulic With Computer Applications",** Tata McGraw Hill, New Delhi, 2008.*
4	*M.K.Natarajan **"Principles of Fluid Mechanics"**, Anuradha Agencies, VidayalKaruppur, Kumbakonam, 2008.*

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
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 and pumps based on head and discharge requirements.	K3

COURSE ARTICULATION MATRIX:

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
CO2	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
CO3	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
CO4	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
CO5	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
22PTC 104	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
1 – Slight, 2 – Moderate, 3 – Substantial															

23PTC105	FLUID MACHINES LABORATORY	SEMESTER I

PREREQUISITES	L	T	P	C
Mechanics of Fluids	0	0	3	1.5

Course Objectives	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.

LIST OF EXPERIMENTS:

1. Determination of Darcy's friction factor
2. Verification of Bernoulli's Theorem
3. Calibration of Venturimeter
4. Flow over V-Notches
5. Flow through Mouthpiece
6. Performance Study of Rotodynamic pumps
7. Performance Study of Positive displacement pumps
8. Load test on Pelton wheel, Francis turbine and Kaplan Turbine.

COURSE OUTCOMES: On completion of the course, the students will be able to:		Bloom's Taxonomy Mapped
CO1	Obtain the knowledge on conducting different type of experiments.	K2
CO2	Solve different problems in pipes due to losses.	K3
CO3	Verify the Bernoulli's theorem and its applications.	K3
CO4	Do performance tests on different types of pumps.	K3
CO5	Do performance tests on different types of turbines.	K3

COURSE ARTICULATION MATRIX:

a) CO and PO Mapping

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1
CO2	2	2	0	2	1	0	1	0	0	0	0	0	0	2	1
CO3	1	2	0	2	0	0	0	0	0	0	0	0	0	2	1
CO4	0	1	0	2	1	0	1	0	0	0	0	0	0	2	1
CO5	0	1	0	2	1	0	1	0	0	0	0	0	0	2	1
23PTC105	2	2	0	2	1	0	1	0	0	0	0	0	0	2	1

1 – Slight, 2 – Moderate, 3 – Substantial