Dr. Ambedkar Institute of Technology, Bengaluru-560056

Scheme of Teaching and Examination for I/II Semester B.E. CBCS, Academic Year-2024-2025

Branch: Civil Engineering

PHYSICS CYCLE **SEMESTER: I**

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	MAU101A	Mathematics-I	Maths	2	2	2	0	4+2	03	50	50	100	04
2	ASC(IC)	PHU102A	Applied Physics	Physics	3	0	2	0	3+2	03	50	50	100	04
3	ESC	CVT103	Engineering Mechanics	Civil	3	0	0	0	3	03	50	50	100	03
4	ESC-1	ESX104X	Engineering Science Course	Respective Engg. Dept.	3	0	0	0	3	03	50	50	100	03
5	ETC-1	ETT105X	Emerging Technology Course-I	Any Engg. Dept.	3	0	0	0	3	03	50	50	100	03
6	AEC	ENT106	Communicative English	Humanities	1	0	0	0	1	02	50	50	100	01
7	HSS	SKT107/BKT107	Samskrutika Kannada / Balake Kannada	Humanities	1	0	0	0	1	02	50	50	100	01
8	HSS	IDT108	Innovation and Design Thinking	Any dept.	1	0	0	0	1	02	50	50	100	01
9	MC	CDN109	Career Development skill-I	Placement Cell	2	0	0	0	2	-	50	---	---	NP/PP
								Total	**25**		**450**	**400**	**800**	**20**

Dr. Ambedkar Institute of Technology, Bengaluru - 560056

Scheme of Teaching and Examination for I/II Semester B.E. CBCS, Academic Year: 2024-2025

Branch: Civil Engineering

CHEMISTRY CYCLE **SEMESTER: II**

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	MAU201A	Mathematics-II	Maths	2	2	2	0	4+2	3	50	50	100	4
2	ASC(IC)	CHU202C	Applied Chemistry	Chemistry	3	0	2	0	3+2	3	50	50	100	4
3	ESC	MED203	Computer Aided Engg. Drawing	Civil/Mech.	2	0	2	0	2+2	3	50	50	100	3
4	ESC-II	ESX204x	Engineering Science Course - II	Respective Engg. Dept.	3	0	0	0	3	3	50	50	100	3
5	ETC-II	PLU205X	Programming Language Course	Any Engg. Dept.	2	0	2	0	3	3	50	50	100	3
6	AEC	ENT206	Professional Writing skills	Humanities	1	0	0	0	1	2	50	50	100	1
7	HSS	CIT207	Constitution of India	Humanities	1	0	0	0	1	2	50	50	100	1
8	HSS	SFT208	Scientific Foundation of Health	Humanities	1	0	0	0	1	2	50	50	100	1
9	MC	CDN209	Career Development skill-II	Placement Cell	2	0	0	0	2	-	50	---	---	NP/PP
				Total					**26**		**450**	**400**	**800**	**20**

(ESC-I) Engineering Science Courses-I						(ETC-I) Emerging Technology Courses-I			
Code ESX104X	**Title**	**L**	**T**	**P**	**Code ETT105X**	**Title**	**L**	**T**	**P**
EST104A	Introduction to Civil Engineering	3	0	0	ETT1051	Introduction to Cyber Security	3	0	0
EST104B	Introduction to Electrical Engineering	3	0	0	ETT1052	Introduction to Internet of Things (IOT)	3	0	0
EST104C	Introduction to Electronics Engineering	3	0	0	ETT1053	Renewable Energy Sources	3	0	0
EST104D	Introduction to Mechanical Engineering	3	0	0	ETT1054	Basics of Waste Management	3	0	0
ESU104E	Introduction to C Programming	2	0	2	ETT1055	Green Buildings	3	0	0
					ETT1056	Smart Materials and Systems	3	0	0
					ETT1057	Introduction to Nano Technology	3	0	0
					ETT1058	Introduction to Sustainable Engineering	3	0	0
					ETT1059	Introduction to Embedded System	3	0	0
(PLC-I) Programming Language Courses-I					**Applied Science Course(ASC)**				
Code PLU105X	**Course Title**	**L**	**T**	**P**	**Code**	**Course Title**			
PLU105A	Introduction to Web Programming	2	0	2	MAU101C	Mathematics – I for ME/IEM/AE	3	0	2
PLU105B	Introduction to Python Programming	2	0	2	CHU102A	Applied Chemistry for ME/IEM/AE	3	0	2
PLU105C	Basics of JAVA programming	2	0	2					
PLU105D	Introduction to C++ Programming	2	0	2					

(ESC-II) Engineering Science Courses-II					(ETC-II) Emerging Technology Courses-II				
Code ESX204X	**Course Title**	**L**	**T**	**P**	**Code ETT205X**	**Course Title**	**L**	**T**	**P**
EST204A	Introduction to Civil Engineering	3	0	0	ETT2051	Introduction to Cyber Security	3	0	0
EST204B	Introduction to Electrical Engineering	3	0	0	ETT2052	Introduction to Internet of Things (IOT)	3	0	0
EST204C	Introduction to Electronics Engineering	3	0	0	ETT2053	Renewable Energy Sources	3	0	0
EST204D	Introduction to Mechanical Engineering	3	0	0	ETT2054	Basics of Waste Management	3	0	0
ESU204E	Introduction to C Programming	2	0	2	ETT2055	Green Buildings	3	0	0
					ETT2056	Smart Materials and Systems	3	0	0
					ETT2057	Introduction to Nano Technology	3	0	0
					ETT2058	Introduction to Sustainable Engineering	3	0	0
					ETT2059	Introduction to Embedded System	3	0	0
(PLC-II) Programming Language Courses-II					**Applied Science Course(ASC)**				
Code PLU205X	**Course Title**	**L**	**T**	**P**	**Code**	**Course Title**	**L**	**T**	**P**
PLU205A	Introduction to Web Programming	2	0	2	MAU201C	Mathematics – II for ME/IEM/AE	3	0	2
PLU205B	Introduction to Python Programming	2	0	2	PHU202C	Applied Physics for ME/IEM/AE	3	0	2
PLU205C	Basics of JAVA programming	2	0	2					
PLU205D	Introduction to C++ Programming	2	0	2					

Semester: I / II	
Course Title: INTRODUCTION TO SUSTAINABLE ENGINEERING	
(ETC-I) Emerging Technology Courses - I	
Course Code: **ETT1057 / ETT2057**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 40 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To familiarize the students to the area of sustainability and concepts of sustainability engineering.
2	To enable students with an understanding of principles and frame work of sustainable engineering.
3	To provide students with an understanding of Life Cycle Assessment tool in sustainable engineering.
4	To provide students with understanding of integration of sustainability with design.

Teaching-Learning Process:

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

UNIT – I	
Sustainable Development and Role of Engineers: Introduction, Why and What is Sustainable Development, The SDFs, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering **Sustainable Engineering Concepts:** Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy.	**8 Hrs**
UNIT – II	
Sustainable Engineering and Concepts, Principles and Frame Work: Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering. **Tools for sustainability Assessment**: Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental.	**8 Hrs**
UNIT – III	
Fundamentals of Life Cycle Assessment: Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological	**8 Hrs**

Choices, LCI Databases and LCA Softwares, Strength and Limitations of LCA.	
UNIT – IV	
Environmental Life Cycle Costing, Social Life Cycle Assessment, and Life Cycle Sustainability Assessment: Introduction, Environmental Life Cycle Costing, Social Life Cycle Assessment, Life Cycle Sustainability, LCA Applications in Engineering: Environmental Product Declarations and Product Category Rules, Carbon and Water Foot Printing, Energy systems, Buildings and the Built Environment, Chemical and Chemical Production Food and Agriculture. **Introduction to Environmental Economics:** Introduction – What Is Environmental Economics?, Valuing the Environment, Market-based Incentives (or Economic Instruments) for Sustainability, Command-and-Control versus Economic Instruments, A Simple Model of Pollution Control.	**8 Hrs**
UNIT – V	
Integrating Sustainability in Engineering Design: Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process – Sustainable Process, Production and product design in Engineering.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Elucidate the basics of sustainable development, sustainable engineering and its role in engineering
2	Application of Sustainable Engineering Concepts and Principles in Engineering
3	Apply the Principle, and methodology of Life Cycle Assessment Tool to engineering systems
4	Understand integration methods of sustainability to Engineering Design

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Introduction to Sustainability for Engineers, Toolseeram Ramjeawon, CRC Press, 1st Edn., 2020.
2	Sustainability Engineering: Concepts, Design and Case studies, Prentice Hall, 1stEdn, 2015.
3	System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1st Edn., 2010.
4	Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd., 2ndEdn, 2016.

Reference Books:	
1	System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1st Edn., 2010.
2	Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1st Edn., 2021.
3	Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1st Edn., 2021.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1						✓	✓	✓	✓			
CO2							✓	✓				
CO3							✓	✓	✓			
CO4							✓					

Semester: I / II	
Course Title: BASICS OF WASTE MANAGEMENT	
(ETC - I Emerging Technology Courses – I)	
Course Code: **ETT1054 / ETT2054**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 40 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To learn broader understandings on various aspects of solid waste management practiced in industries.
2	To learn methods of collection, transport and storage of solid waste to go for further treatments such as volume reduction, densification.
3	To learn recovery of products from solid waste through various process such as compost and biogas, incineration and also energy recovery.
4	To understand sanitary landfill operation and in overall integrated waste management.

Teaching-Learning Process:

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

UNIT – I	
INTRODUCTION TO SOLID WASTE MANAGEMENT: Classification of solid wastes (source and type based), solid waste management (SWM), elements of SWM, ESSWM (environmentally sound solid waste management) and EST (environmentally sound technologies), factors affecting SWM, Indian scenario, progress in MSW (municipal solid waste) management in India.	**8 Hrs**
UNIT – II	
WASTE GENERATION ASPECTS: Waste stream assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions.	**8 Hrs**
UNIT – III	
COLLECTION, STORAGE AND TRANSPORT OF WASTES: Waste Collection, Storage and Transport: Collection components, storage-containers/collection vehicles, collection operation, transfer station, waste collection system design, record keeping,	**8 Hrs**

control, inventory and monitoring, implementing collection and transfer system.	
UNIT – IV	
WASTE PROCESSING TECHNIQUES & SOURCE REDUCTION, PRODUCT RECOVERY & RECYCLING: Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering. Source Reduction, Product Recovery and Recycling: basics, purpose, implementation monitoring and evaluation of source reduction, significance of recycling, planning of a recycling programme, recycling programme elements, commonly recycled materials and processes, a case study.	**8 Hrs**
UNIT – V	
WASTE DISPOSAL: Key issues in waste disposal, disposal options and selection criteria, sanitary landfill, landfill gas emission, leachate formation, environmental effects of landfill, landfill operation issues. Leachate and landfill gas management –landfill closure and post closure care. Types and methods of composting.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Apply the basics of solid waste management towards sustainable development.
2	Apply technologies to process waste and dispose the same.
3	Design working models to convert waste to energy.
4	Identify and classify hazardous waste and manage the hazard.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:

1. Tchobaanoglous, G., Theisen, H., and Samuel A Vigil, Integrated Solid Waste Management, McGraw-Hill Publishers, 1993.
2. White, F. R., Franke P. R., & Hindle M., Integrated solid waste management: a life cycle inventory. McDougall,P. John Wiley & Sons. 2001

Reference Books:

1. Nicholas, P., & Cheremisinoff, P. D., Handbook of solid waste management and waste minimization technologies, Imprint of Elsevier Science. 2005
2. Bilitewski B., Hard He G., Marek K., Weissbach A., and Boeddicker H., Waste Management, Springer, 1994.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓	✓					
CO2						✓		✓				
CO3					✓		✓					
CO4					✓		✓		✓			

Semester: I / II	
Course Title: GREEN BUILDINGS	
(ETC-I) Emerging Technology Courses - I	
Course Code: **ETT1055 / ETT2055**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 40 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	Understand the Definition, Concept and Objectives of the terms cost effective construction and green building.
2	Apply cost effective techniques in construction.
3	Understand the Problems due to Global Warming.
4	State the Concept of Green Building.

Teaching-Learning Process:

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

UNIT – I	
Introduction to the concept of cost effective construction: Uses of different types of materials and their availability- Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials-Recycling of building materials-Brick-Concrete-Steel-Plastics – Environmental issues related to quarrying of building materials.	**8 Hrs**
UNIT – II	
Environment friendly and cost effective Building Technologies: Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof - Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies - Costford - Nirmithi Kendra – Habitat.	**8 Hrs**
UNIT – III	
Global Warming and Green buildings: Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon	**8 Hrs**

Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings. – Embodied Energy in Materials Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.	
UNIT – IV	
Utility of Solar Energy in Buildings: Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. **Green Composites for Buildings:** Concepts of Green Composites. Water Utilization in Buildings, Low Energy Approaches to Water, Management. Management of Solid Wastes, Sullage Water and Sewage.	**8 Hrs**
UNIT – V	
Green Building rating Systems: BREEAM – LEED - GREEN STAR - GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Lifecycle design of Materials and Structures (Concepts only)	**8 Hrs**

Course Outcomes: The students will be able to	
1	Select different building materials for construction.
2	Apply effective environmental friendly building technology.
3	Analyse global warming due to different materials in construction.
4	Analyse buildings for green rating, to use alternate source of energy and the effective use water.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:

1. HarharaIyer G, Green Building Fundamentals, Notion Press.
2. Dr. Adv. HarshulSavla, Green Building: Principles & Practices.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓							✓
CO2	✓				✓		✓	✓			✓	✓
CO3	✓				✓		✓	✓	✓		✓	✓
CO4	✓				✓		✓	✓	✓		✓	✓

Semester: I / II	
Course Title: INTRODUCTION TO CIVIL ENGINEERING	
(ESC-I) Engineering Science Courses - I	
Course Code: **EST104A / EST204A**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 40 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To make students learn the scope of various specializations of civil engineering.
2	To make students learn the concepts of sustainable infrastructure
3	To develop students ability to analyze the problems involving forces, moments with their applications.
4	To understand the concept of equilibrium and friction along with their applications.
5	To develop the student's ability to find out the center of gravity and moment of inertia and their applications.

Teaching-Learning Process:

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

UNIT – I	
Civil Engineering Disciplines and Building Science **Introduction to Civil Engineering:** Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management. **Basic Materials of Construction**: Bricks, Cement & mortars, Plain, Reinforced & Pre-stressed Concrete, Structural steel, Construction Chemicals. **Structural elements of a building:** Foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase.	**8 Hrs**
UNIT – II	
Societal and Global Impact of Infrastructure **Infrastructure**: Introduction to sustainable development goals, Smart city concept, clean city concept, Safe city concept **Environment**: Water Supply and Sanitary systems, urban air pollution management, Solid waste	**8 Hrs**

management, identification of Landfill sites, urban flood control **Built-environment:** Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.	
UNIT – III	
Analysis of force systems: Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, free body diagram, equations of Equilibrium, Equilibrium of Concurrent and Non Concurrent force systems. Numerical examples.	**8 Hrs**
UNIT – IV	
Support Reactions: Types of Beams, Loads and Supports, Numerical Examples. **Friction:** Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, Numerical examples.	**8 Hrs**
UNIT – V	
Centroid: Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections, Numerical examples. **Moment of inertia:** Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up Sections.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Understand the various disciplines, infrastructure requirement for sustainable development of civil engineering.
2	Examine the types of force system and compute their resultant at various conditions.
3	Analyze the problems to obtain support reactions, the behavior of bodies in contact with different surfaces.
4	Locate the centroid of plane and built-up sections and Compute the moment of inertia of plane and built-up sections.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of three sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2	Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB
3	Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
4	Bhavikatti S S, Engineering Mechanics, 2019, New Age International
5	Reddy Vijay Kumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

Reference Books:	
1	Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
2	Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
3	Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓	✓					✓
CO2	✓	✓		✓								✓
CO3	✓	✓		✓								✓
CO4	✓	✓		✓								✓

Semester: I	
Course Title: ENGINEERING MECHANICS	
(ESC - Engineering Science Courses)	
Course Code: **CVT103**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 50 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To make students learn the scope of various specializations of civil engineering.
2	To make students learn the concepts of sustainable infrastructure.
3	To develop students ability to analyze the problems involving forces, moments with their applications.
4	To develop the student's ability to find out the center of gravity and moment of inertia and their applications.
5	To make the students learn about kinematics and kinetics and their applications.

Teaching-Learning Process:

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

UNIT – I	
Resultant of coplanar force system: Basic dimensions and units, Idealizations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.	**10 Hrs**
UNIT – II	
Equilibrium of coplanar force system: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples.	**10 Hrs**
UNIT – III	
Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples. **Friction:**	**10 Hrs**

Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.	
UNIT – IV	
Centroid of Plane areas: Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples. **Moment of inertia of plane areas:** Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections,, Numerical examples.	**10 Hrs**
UNIT – V	
Kinematics: Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion Projectiles: Introduction, numerical examples on projectiles. **Kinetics:** Introduction, D 'Alembert's principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys, Numerical examples.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Understand the concept of engineering mechanics, force system and Compute the resultant of various force system, examine the types of loads on rigid bodies and compute the reactive forces in various member of the structure and trusses.
2	Analyze the problems to obtain reactive forces in various member of the structure and the behavior of bodies in contact with different surfaces.
3	Locate the centroid and Compute the moment of inertia of plane and built-up sections.
4	Explain the basics of dynamics and analyze the bodies in motion

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of three sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2	Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB
3	Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
4	Bhavikatti S S, Engineering Mechanics, 2019, New Age International
5	Reddy Vijay Kumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

Reference Books:	
1	Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
2	Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
3	Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓		✓								✓
CO3	✓	✓		✓								✓
CO4	✓	✓		✓								✓