Course Code:BCVA103C / BCVA203C	ENGINEERING MECHANICS	Credits : 03
Hours/Week (L:T:P) : 2:2:0		CIE Marks : 50
Total Hours of Pedagogy (Theory + Lab): 25hrsLecture+25hrsTutorial=50hrs		SEE Marks : 50
Course Type: Theory		

Courseobjectives

- Todevelopstudents'abilitytoanalyzetheproblemsinvolvingforces,momentswiththeir applications.
- Toanalyzethememberforcesin trusses
- Tomakestudentstolearntheeffectoffrictionondifferent planes
- Todevelopthestudent's abilitytofindouttheCentreofgravityandmomentofinertiaand their applications.
- Tomakethestudentslearnaboutkinematicsandkineticsandtheir applications.

Module-1	08 Hrs.

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, Freebodydiagrams,moment,Principleofmoments,couple,Resultantofcoplanarconcurrentforces ystem,Resultantofcoplanarnon-concurrentforcesystem,Numericalexamples.

Module-2	08 Hrs.

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.

Module-3	08 Hrs.

Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.

Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.

Module-4	08 Hrs.

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.

Module-5	08 Hrs.

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-planeMotion and connected bodies including pulleys, Numerical examples.

Suggested Learning resources

Textbooks:

1. BansalR.K.,RakeshRanjanBeoharandAhmadAliKhan,BasicCivilEngineeringand Engineering Mechanics, 2015, Laxmi Publications.
2. KolhapureBK,ElementsofCivilEngineeringandEngineeringMechanics,2014,EBPB

ReferenceBooks:

1. BeerF.P.andJohnstonE.R.,MechanicsforEngineers,StaticsandDynamics,1987,McGraw Hill.
2. IrvingH.Shames,EngineeringMechanics,2019,Prentice-Hall.
3. HibblerR.C.,EngineeringMechanics:PrinciplesofStaticsandDynamics,2017,PearsonPress.
4. TimoshenkoS,YoungD.H.,RaoJ.V.,EngineeringMechanics,5thEdition,2017,Pearson Press.
5. BhavikattiSS,EngineeringMechanics,2019,NewAge International

ReddyVijaykumarKandSureshKumarK,EngineeringMechanics,2011,BSpublication

Course Outcomes:

CO1: Computetheresultantofaforcesystemand resolutionofa force
CO2: Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces
CO3: Analyze the frictional resistance offered by different planes
CO4: Locatethe centroidandcomputethemoment ofinertiaof sections
CO5: Analyze the bodies in motion

CO and PO Mapping

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3										
CO2	2	3										
CO3	2	3										
CO4	2	3										
CO5	2	3										

BCVA105B / BCVA205B	GREEN BUILDING TECHNOLOGY	Credits: 3
L:T:P - 3 : 0: 0		CIE Marks: 50
Total Hours/Week: 3		SEE Marks: 50

UNIT-I	10 Hrs.

Introduction of green building, Concept of green building, History of green building, Need of green building in present scenario, Importance of green building Merits and demerits, Classification of green building.IGBC

Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials.

UNIT–II	08 Hrs.

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.

UNIT–III	08 Hrs.

Global Warming – Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon 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 MaterialsGreen Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.

UNIT–IV	08 Hrs.

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).

UNIT–V	08 Hrs.

Utility of Solar Energy in Buildings

Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.

Green Composites for Buildings

Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water

Management. Management of Solid Wastes. Management of Sullage Water.

REFERENCE BOOKS**

1. Climate responsive architecture (A design hand book for energy efficient buildings), Arvind Krishnana, Simos Yannas, Nick Baker, S V Szokolay, McGraw hill Education, Seventh reprint, 2013.
2. Renewable Energy and Environment -A Policy Analysis for India, H, Ravindranath, K Usha Rao, B Natarajan, P Monga, Tata McGraw Hill, 2000.Energy and the Environment, JM Fowler, McGraw Hill, New York, 2nd Edition, 1984.
3. Handbook on functional requirements of buildings (SP41), BIS, New Delhi, 1987.
4. Energy Conservation building code (ECBC), Bureau of energy efficiency, 2011.
5. IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green Building Council Publishers.
6. GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
7. Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.
8. Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.
9. Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.
10. Charles J. Kibert, Sustainable Construction – Green Building Design and Delivery, John Wiley &Sons, New York, 2008.
11. Regina Leffers, Sustainable Construction and Design, Pearson / Prentice Hall, USA, 2009.
12. HarharaIyer G, Green Building Fundamentals, Notion Press
13. Dr. Adv. HarshulSavla, Green Building: Principles & Practices

Course Outcomes**

After completion of the course student will be able to

1. Select different building materials for construction and able to assess a building on the norms of IGBC for green building.
2. Apply effective environmentally friendly building technology
3. Analyze global warming due to different materials in construction.
4. Analyze buildings for green rating.
5. Use alternate source of energy and effective use water.

COs and POs Mapping

COs	**POs**								
	1	2	3	4	5	6	7	8	9
CO1	2	1				1	1		
CO2	2	1				1	1		

CO3	2	1				1	1		
CO4	2	1				1	1		
CO5	2	1				1	1		

Course Code: **BCVA104N / BCVA204N**	**Introduction to Civil Engineering**	**Credits: 03**
Hours/Week (L:T:P) : 3-0-0		**CIE Marks : 50**
Total Hours of Pedagogy (Theory+Lab): 40		**SEE Marks : 50**
Course Type: Theory		

Course Objectives:

- To make students learn the scope of various specializations of civil engineering.
- To make students learn the concepts of sustainable infrastructure
- To develop students' ability to analyse the problems involving forces, moments with theirapplications.
- To develop the student's ability to find out the center of gravity of different builtup sections and theirapplications.
- To develop the student's ability to find out themoment of inertia of different builtup sections inertia and theirapplications.

Module-1	**8 Hrs.**

Civil Engineering Disciplines and Building Science

Introduction to Civil Engineering: Surveying, StructuralEngineering, Geotechnical Engineering,Hydraulics & Water Resources, TransportationEngineering, 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

Module-2	**8 Hrs.**

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 wastemanagement, identification of Landfill sites, urban flood control

Built-environment: Energy efficient buildings, recycling, Temperature andSound control in buildings, Security systems; Smart buildings

Module-3	**8 Hrs.**

Analysis of force systems: Concept of idealization, system of forces, principles of superpositionand 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 coplanar force systems. Numerical examples

Module-4	**8 Hrs.**

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

Module-5	**8 Hrs.**

Moment of inertia: Importance of Moment of Inertia, method of determining the second moment ofarea (moment of inertia) of plane sections from first principles, parallel axis theorem andperpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up sections, Numerical Examples

Suggested Learning resources

Text Books

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering andEngineering Mechanics, 2015,Laxmi Publications.

2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

Reference Books:

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.

2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.

3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.

4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.

5. Bhavikatti S S, Engineering Mechanics, 2019, New Age International

6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

Course Outcomes:

CO1: Understand the various disciplines of civil engineering
CO2: Understand the infrastructure requirement for sustainable development
CO3: Compute the resultant and equilibrium of force systems.
CO4: Locate the centroid of plane and built-up sections
CO5: Compute the moment of inertia of plane and built-up sections.

CO and PO Mapping

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	3	-	-	-	-	-	-	-	-	-
CO4	2	3	3	-	-	-	-	-	-	-	-	-
CO5	2	3	3	-	-	-	-	-	-	-	-	-

BCVB105B / BCVB205B	WASTE MANAGEMENT	Credits: 3
L:T:P - 3 : 0: 0		CIE Marks: 50
Total Hours/Week: 3		SEE Marks: 50

UNIT-I	08 Hrs.

INTRODUCTION TO SOLID WASTE MANAGEMENT:

Introduction: Definition, Land pollution, Types and sources of solid waste, Classification and generation of Solid wastes and Municipal solid waste. Functional elements of Municipal solid waste management.

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 and global scenario of e-waste.

UNIT–II	08 Hrs.

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. E-waste generation.

UNIT–III	08 Hrs.

COLLECTION, STORAGE, TRANSPORT AND DISPOSAL OF WASTES:

Waste Collection, Storage and Transport: Collection components, storage-containers/collection vehicles, collection operation, transfer station, waste collection system design, record keeping, control, inventory and monitoring, implementing collection and transfer system, a case study.

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, a case study.

UNIT–IV	08 Hrs.

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, commonly recycled materials and processes, a case study.

UNIT–V	08 Hrs

HAZARDOUS WASTE MANAGEMENT AND TREATMENT:

Identification and classification of hazardous waste, hazardous waste treatment, pollution prevention and waste minimization, hazardous wastes management in India. Biomedical waste,

E-waste recycling.

Reference Books *

1. George Tchobanoglous, Integrated Solid Waste Management, Mc Graw Hill, 4th edition 2015.
2. 2. P.W. Powers. How to dispose of toxic substances and industrial Waste, Noyes Data Corporation, England, 3rd edition, 1976.CPCB, Guide Manual: Water and Wastewater Analysis.
3. Howard S. Peavy, Donald R. Rowe, George Tchobanoglous, Environmental Engineering McGraw Hill Indian Edition 2013.
4. Santosh Kumar garg, Sewage disposal and air pollution Engineering, Khanna publisher, Vol. 2 25th edition 2012.
5. Waste Management Practices: Municipal, Hazardous and Industrial, John Pichtel, CRC Press, 2014, 2nd Edition.
6. Solid Waste Engineering, Vesilind PA, Worrell W and Reinhart D, Brooks/Cole Thomson Learning Inc., 2010, 2nd Edition.
7. Biomedical waste handling rules - 2012.
8. White, F. R., Franke P. R., & Hindle M., Integrated solid waste management: a life cycle inventory.
9. Mc Dougall,P. John Wiley & Sons. 2001
10. 2. Nicholas, P., & Cheremisinoff, P. D., Handbook of solid waste management and waste minimization technologies, Imprint of Elsevier Science. 2005

Course Outcomes**

After completion of the course student will be able to

1. Ability to identify types and sources and classification and characteristics and functional elements of solid waste.
2. Analyze the various collection and transportation techniques of solid waste management.
3. Evaluate the techniques of physical, chemical and biological processing of solid waste.
4. Design the sanitary landfill and study the disposal, reuse of solid waste, E-waste, Bio-medical waste and plastic wastes.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	1	-	3	3	-	2	-	-	3	2	3	2
CO2	3	2	2	2	-	3	3	-	2	-	-	3	2	3	2
CO3	3	2	3	3	-	3	3	-	2	-	-	2	3	2	3
CO4	3	2	2	3	-	3	3	-	2	-	-	2	3	2	3