

CEEY 258	ENERGY CONSERVATION	L	T	P	C
	TECHNIQUES IN BUILDING	3	0	0	3
SDG: 11	CONSTRUCTION				

COURSE OBJECTIVES: The course will impart knowledge on

COB1: the concept of design of energy conservation buildings

COB2: passive solar heating and cooling

COB3: design the day lighting and electrical lighting systems

COB4: heat control and ventilation for thermal building

COB 5: design the various climatic zones

MODULE I INTRODUCTION 9

Energy required for building construction - heat transfer – measuring conduction – thermal storage – measurement of radiation – the green house effect – psychometric chart – measuring latent and sensible heat. thermal comfort – site planning and development – temperature – humidity – wind – optimum site location sun protection –types of shading devices – conservation – heating and cooling loads - IGBC rating systems - sustainable sights - water efficiency - energy efficiency - materials and resources - indoor environmental quality.

MODULE II PASSIVE SOLAR HEATING AND COOLING 9

General principles of passive solar heating – key design elements - direct gain trombe walls, water walls, convective air loops – concepts – case studies – general principles of passive cooling – ventilation – predicting ventilation in building-window ventilation calculations - radiation – evaporation and dehumidification–mass effect– load control – air filtration and odor removal – heat recovery in large buildings

MODULE III DAYLIGHTING AND ELECTRICAL LIGHTING 9

Materials, components and details - insulation – optical materials – radiant barriers glazing materials - day lighting – sources and concepts – building design strategies – case studies – electric lighting –light distribution – electric lighting control for day lighted buildings – illumination requirement – components of daylight factor – recommended daylight factors – day lighting analysis – supplementary artificial lighting design

MODULE IV HEAT CONTROL AND VENTILATION 9

Requirements – heat transmission through building sections – thermal performance of building sections – orientation of buildings – building

characteristics for various climates – thermal design of buildings influence of design parameters – mechanical controls – examples. Ventilation – requirements – minimum standards for ventilation – ventilation design – energy conservation in ventilating systems – design for natural ventilation.

MODULE V DESIGN FOR CLIMATIC ZONES 9

Energy efficiency – an overview of design concepts and architectural interventions– energy efficient buildings for various zones – cold and cloudy – cold and sunny – composite – hot and dry – moderate – warm and humid – case studies of residences, office buildings and other buildings in each zones – energy audit –certification.

L – 45 TOTAL HOURS –45

TEXT BOOKS:

1. Paul Tymkow, Savvas Tassou, Maria Kolokotroni, Hussam Jouhara, Building Services Design for Energy Efficient Buildings, Taylor and francis, 2021

REFERENCES:

1. Brown, G.Z. and DeKay, M., Sun, Wind and Light - Architectural Design Strategies, John Wiley and Sons Inc, 2013
2. Energy Conservation Building Code, Bureau of Energy Efficiency, New Delhi, 2017.
3. Handbook on Functional Requirements of Buildings Part 1 to 4 SP : 41 (S and T) 2016
4. Majumdar, M (Ed), Energy - Efficient Buildings in India, Tata Energy Research Institute, Ministry of Non Conventional Energy Sources, 2009.
5. Moore, F., Environmental Control System, McGraw Hill Inc. 2002.
6. Tyagi, A.K. (Ed). Handbook on Energy Audits and Management Tata Energy Research Institute, 2010.

COURSE OUTCOMES: On completion of the course, students will be able to

CO1: identify the required energy for building construction.

CO2: design and analyse the passive solar cooling and heating technique.

CO3: identify the required amount of daylight and electrical lighting for a building.

CO4: analyse the ventilation and thermal design of a building.

CO5: design a specific type of building for special climatic zones.

Board of Studies (BoS) :

17th BoS of Civil held on 10.08.2022

Academic Council:

19th AC held on 29.09.2022

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	L	L	M	-	-	L	-	L	-	-	-	-	L	L	L
CO2	L	L	M	-	-	L	-	L	-	-	-	-	-	M	-
CO3	L	L	M	-	-	-	-	L	-	-	-	-	-	M	-
CO4	L	L	M	-	-	L	-	L	-	-	-	-	-	M	-
CO5	L	L	M	-	-	L	-	L	-	-	-	-	-	-	-

Note: L- Low Correlation M -Medium Correlation H -High Correlation

SDG 11 :Make cities and human settlements inclusive, safe, resilient and sustainable

The holistic understanding of modern energy conservation construction techniques leads to development of energy efficient buildings