AMAR-11 CLIMATE AND BUILT ENVIRONMENT

OBJECTIVES:

To study human heat balance and comfort.

To familiarize students with the design and settings for buildings for daylight and factors that influence temperature

To inform about the air pattern around buildings and the effect of wind on design and siting of buildings

To expose the students to the various design strategies for building in different types of climatic zones.

UNIT I CLIMATE AND HUMAN COMFORT 10

Factors that determine climate of a place – Components of Climate – Climate classifications for building designers in tropics – Climate characteristics. Human body heat balance – Human body heat loss – Effects of climatic factors on human body heat loss – Effective temperature – Human thermal comfort – Use of C.Mahony's tables.

UNIT II DESIGN OF SOLAR SHADING DEVICES 8

Movement of sun – Locating the position of sun – Sun path diagram – Overhead period–Solar shading–Shadow angles – Design of appropriate shading devices

UNIT III HEAT FLOW THROUGH BUILDING ENVELOPE CONCEPTS 9

The transfer of heat through solids – Definitions – Conductivity, Resistivity, Specific heat, Conductance, Resistance and Thermal capacity – Surface resistance and air cavities – Air to air transmittance (U value) – Time lag and decrement – Types of envelops with focus on glass.

UNIT IV AIR MOVEMENT DUE TO NATURAL AND BUILT FORMS 9

The wind – The effects of topography on wind patterns – Air currents around the building – Air movement through the buildings – The use of fans – Thermally induced air currents – Stack effect, Venturi effect – Use of court yard.

UNIT V CLIMATE AND DESIGN OF BUILDINGS 9

Design strategies in warm humid climates, hot humid climates, hot and dry climates and cold climates – Climate responsive design exercises

TOTAL: 45 PERIODS

OUTCOMES

Understanding of Thermal balance in Human beings
Designing Climate responsive structure
Conceptual understanding of Air flow in Buildings

REQUIRED READINGS:

O.H. Koenigsberger and Others, “Manual of Tropical Housing and Building” – Part I - Climate design, Orient Longman, Madras, India, 2010.
Bureau of Indian Standards IS 3792, “Hand book on Functional requirements of buildings other than industrial buildings”, 1987.

REFERENCES:

Martin Evans, “Housing Climate and Comfort”, Architectural Press, London, 1980
B. Givoni, “Man, Climate and Architecture”, Architectural Sciences Series – Applied Science Publishers Ltd., London, 1981.
B. Givoni, “Passive and Low Energy Cooling of building”, Van Nortrand Reinhold New York, USA, 1994.
Galloe, Salam and Sayigh A.M.M., “Architecture, Comfort and Energy”, Elsivier Science Ltd., Oxford, U.K., 1998.