

## **AMAR-25 ENERGY EFFICIENT ARCHITECTURE**

### **OBJECTIVES:**

To inform the need to use alternative sources of energy in view of the depleting resources and climate change.

To familiarise the students with simple and passive design considerations

To inform about the importance of day lighting and natural ventilation in building design

To make the students aware of the future trends in creating sustainable built environment.

### **UNIT I PASSIVE DESIGN 10**

Significance of Energy Efficiency in the contemporary context, Simple passive design considerations involving Site Conditions, Building Orientation, Plan form and Building Envelope - Heat transfer and Thermal Performance of Walls and Roofs

### **UNIT II ADVANCED PASSIVE ARCHITECTURE- PASSIVE HEATING 10**

Direct Gain Thermal Storage of Wall and Roof - Roof Radiation Trap - Solarium - Isolated Gain

### **UNIT III PASSIVE COOLING 8**

Evaporative Cooling - Nocturnal Radiation cooling - Passive Desiccant Cooling – Induced Ventilation - Earth Sheltering - Wind Tower - Earth Air Tunnels

### **UNIT IV DAY LIGHTING AND NATURAL VENTILATION 5**

Daylight Factor - Daylight Analysis - Daylight and Shading Devices - Types of Ventilation - Ventilation and Building Design.

### **UNIT V CONTEMPORARY AND FUTURE TRENDS 12**

Areas for innovation in improving energy efficiency such as Photo Voltaic Cells, Battery Technology, Thermal Energy Storage, Recycled and Reusable Building materials, Nanotechnology, smart materials and the future of built environment, Energy Conservation Building code.

**TOTAL: 45 PERIODS**

### **OUTCOMES:**

The students are exposed to alternative sources of energy and are exposed to passive design considerations

An understanding on day lighting and natural ventilation in design in addition to the future trends in creating sustainable built environment

### **REQUIRED READING:**

1. Manual on Solar Passive Architecture, IIT Mumbai and Mines New Delhi, 1999
2. Arvind Krishnan & Others, "Climate Responsive Architecture", A Design Handbook for Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2001
- Majumdar M, "Energy-efficient Building in India", TERI Press, 2000.
- Givoni .B, "Passive and Low Energy Cooling of Buildings", Van Nostrand Reinhold, New York, 1994

### **REFERENCES:**

- Fuller Moore, "Environmental Control Systems", McGraw Hill INC, New Delhi - 1993
- Sophia and Stefan Behling, Solpower, "The Evolution of Solar Architecture", Prestel, New York, 1996
- Patrick Waterfield, "The Energy Efficient Home: A Complete Guide", Crowood press ltd, 2011.
- Dean Hawkes, "Energy Efficient Buildings: Architecture, Engineering and Environment", W.W. Norton & Company, 2002

David Johnson, Scott Gibson, "Green from the Ground Up: Sustainable, Healthy and Energy efficient home construction", Taunton Press, 2008