

BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHIBPUR

B.ARCH. 7TH SEMESTER FINAL EXAMINATION, 2011
Energy Efficient Architecture (AR 704)

Full Marks: 35

Time: 2 Hours

- A. Figures in the margin indicate full marks for the question.
B. Use only one answer script

Answer Question No. 6 and any Three from the rest.

1. Write Short notes on *any two* of the following:
 - i. Building Automation System as a part of Integrated Building Management System
 - ii. Energy Conservation Building Code 2007 – in respect of its Scope, Applicable building systems and Exemptions
 - iii. Fixing of standard solar photovoltaic (SPV) modules on building roof or open ground
 - iv. Measures taken before construction for Green Buildings – in respect of Soil and landscape conservation; and, Health and well being

2x4 = 8
2.
 - a. Name the different states of energy contained in fossil fuel.
 - b. Define 'Calorific Value' and 'Efficiency' with reference to (a) above.
 - c. Write a brief note on scoring system of *TERI-GRIHA*, a primary rating system in India for Green buildings.

2+3+3 = 8
3.
 - a. Mention the merits and demerits of various mechanical heating systems in a tabular form.
 - b. Write the salient points on design and installation (orientation, tilt etc.) of active solar collectors.

4+4 = 8
4.
 - a. What are the major limitations in the assumptions of heat transfer under steady state conditions?
 - b. What are the different levels of cooling for a building?
 - c. Discuss *any one* of Convective Cooling and Radiant Cooling with its working principles and applicability.

2+2+4 = 8
5.
 - a. What are the four inter-related components in passive solar buildings?
 - b. Describe with annotated sketches *one* major type of passive solar system and its salient features.

3+5 = 8
6.
 - a. A wall has a total area of 8 m² of which 2 m² are windows. The U-values are 0.75 W/m² degC for the masonry work and 2.8 W/m² degC for the glazing. If the area of the window is doubled, calculate the percentage change in average U-value for the wall.
 - b. A room has the above external wall (original configuration, before change) and its air temperature is maintained at 26°C when the outside temperature is 38°C. Calculate the boundary temperature on the internal surface of the wall. The internal surface resistance is 0.123 m²degC/W.
 - c. The cooling load on an air-conditioning system is 5.0 kW for maintaining indoor temperature at 26°C. If the supply air temperature is 16°C and the air inlet velocity is to be limited to 2 m/sec, calculate the size (Area and dimension) of the inlet opening.

3+4+4 = 11