

**BACHELOR OF ARCHITECTURE  
(B.ARCH)**

**Term-End Examination**

**June, 2014**

**BAR-029 : ARCHITECTURAL SCIENCES AND  
SERVICES - I (CLIMATOLOGY)**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Question No. 1 is compulsory. Answer five questions  
in all. Use of calculator is permitted.*

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1. Answer any seven from below : 7x2=14
- (a) Psychrometric chart
  - (b) Urban Climate
  - (c) Predicted Four Hour Sweat Rate
  - (d) Kata thermometer
  - (e) Cavity resistance
  - (f) Thermal diffusivity
  - (g) Glare
  - (h) Daylight protractors
2. What is meant by thermal balance of human body ? Define thermal comfort. Explain with the aid of bioclimatic chart. 14

3. An office has an area of 60 sqm with floor height of 3 m and occupancy of 5 persons. The external wall area is 40 sqm which includes 4 sqm of double glazed windows. The thermal transmittance rate (u) of external wall is 0.35 and window is 2.00. External and internal design temperatures are 34°C and 22°C respectively. 14

Find :

- (a) The heat gain through the external walls and windows (in watts).
- (b) If 20 lit/sec/person of air is extracted from the office.

Calculate the ventilation rate in terms of air changes per hour.

4. (a) An unplastered brick work has a resistivity of 0.83 m deg C/W. For a 230 mm thick brick wall, the inside and outside surface resistances are 0.123 and 0.1 m<sup>2</sup> deg C/W respectively. 7

Find the R-value of the given wall section (in m<sup>2</sup> deg C/W). The brick wall has an overall dimension of 6 m × 3 m with a 1 m × 2 m window assembly (U-value = 2.5 w/m<sup>2</sup> deg C) and a 1 m × 2.1 m door assembly (U value = 1.25 w/m<sup>2</sup> deg C). Find the overall U value of the wall U<sub>0</sub>.

- (b) Explain the following terms : 7
  - (i) Horizontal shadow angle
  - (ii) Vertical shadow angle
  - (iii) Wall azimuth angle

5. How does orientation of a building affect air movement inside the building ? Explain in detail. 14

6. Describe any modelling/checking tools for arriving at (a) air flow around building (b) prediction of insolation and shading. 14
7. (a) What is the traditional housing style in tropical upland climates? 14  
(b) What considerations would you take in following stages with respect to housing in tropical upland climates?  
(i) form and planning  
(ii) external spaces
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