B.Arch. Examination, 2017

(2nd Year, 1st Semester)

CLIMATE & ARCHITECTURE

Full Marks: 100   Time: Three Hours

The figures in the margin indicate full marks

Question No.1 is compulsory and to answer any five from the remaining questions

1.

(a) Fill in the Blanks

(i) The intensity of radiation reaching the upper surface of the atmosphere is taken as _____ w/m^2.

(ii) The slippage at the boundary layer between the earth and its atmosphere is caused by _____ force.

(iii) _____ heat loss depends on the temperature of the body surface and temperature of opposing surfaces.

(iv) If the Latent heat of water is 2400kj/kg, the evaporation rate of 1kg/h will produce a heat loss of _____ watt.

(v) $10^{\circ}C$ is _____ $^{\circ}K$

(vi) _____ is defined as the heat flow rate through the construction due to solar radiation expressed as a fraction of the incident solar radition.

(vii) The conduction heat flow through a wall of a given area can be calculated by $Q_c = A \times$ ____ $\times$ Temp difference.

(viii) _____ heat helps in evaporation.

(ix) The solar radiation which reaches the ground as direct & diffuse radiation is _____ %.

(x) The process in which the human body reaches its adjustment in ꞁ days after being introduced to new climatic conditions is known as _____

(b)

(i) In the given Psychrometric chart for DBT of $35^{\circ}C$ and RH of 50%, show the values of WBT, Dew point, Absolute Humidity, Vapour Pressure & Enthalpy.   05

(ii) In the given Psychrometric chart, also show how to achieve the following- Sensible Heating & Cooling, Dehumidifying, Evaporative cooling, Heating and Humidifying   05

(iii) From the given Psychrometric chart find the amount of moisture in g/kg that will condense to achieve DBT of $20^{\circ}C$ & 60% RH (the given condition is DBT of $25^{\circ}C$ & RH of 65%)   05

2. (a) Write short notes on : Any 5 (5 x2=10)   10

      (i) U-Value (ii) Tropical Climate,(iii) Trombe Wall

      (iv) Urban Heat Island,(v)   Sol-Air-Temperature,(vi) Effective Temperature

(b) Discuss the broad classifications of Climatic zones in India as per NBC.   05

3. (a) Define the term ambient temperature.   02
    (b) Describe Evaporative cooling techniques with sketches.   05
    (c) Explain EAT and its importance in environmental Design?   05
    (d) What is an Solar Chimney and its role in passive design?   03
4. (a) Differentiate between the following (any 5) (5x3 =15)   15
        (i) Micro climate & Macro Climate
        (ii) Weather & Climate
        (iii) Trade winds & Westerlies
        (iv) Precipitation & Driving Rain
        (v) P/A Ratio & S/V ratio
        (vi) HSA & VSA
5. (a) Briefly explain the importance of fenestration configuration in climate responsive
        building design.   05
    (b)   How can vegetation play a role in site planning and designing buildings in warm humid
        climate.   05
    (c)   Explain the role of Sky View Factor in Urban Heat island study.   05
6   (a) Briefly explain the aspects of Warm Humid Climate & Composite Climate and various
        design features to take into considerations while site planning & building Design.   10
    (b) What is a wind rose diagram and why is it important for architects.   05
7. (a) In the given Sun-path Diagram show the Date Line for June & December, Hour Line,
        Altitude, Azimuth   05
    (b) Design the louvre for the window using the sun-path diagram and protractor for the
        following given conditions.(The building plan with 4m x 5m and the longer axis with NE
        orientation. The window height is of 1200 mm and at the centre of 5m wall.)   07
    (C) Define Egg Crate louvers and its importance.   03

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08. A   5 x 5 m and 2.5m high office is located on an intermediate floor of a large building, so it has only one exposed wall facing south, all other walls adjoin rooms kept at the same temperarure Ti=20°c. The Ventilation rate is 3 air changes per hour. Three 100 w bulbs are in continuous use to light the rear part of the room, which is used by four clerical workers. The exposed 5x2.5 m wall consists of a single glazed window, 1.5 x 5m=7.5m^2, U=4.48 W/m^{2}deg C, and a clinker concrete spandrel wall, 200mm, rendered and plastered, 1 x 5m= 5m^2, U=1.35 W/m^2 degC. State the type of mechanical installation and find rate of heat flow required for the installation to be used.   15