

## Unit 9 - Week 7: Fundamentals of Flat Plate Collectors

Course outline
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## Assignment 7

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

**Due on 2020-11-04, 23:59 IST.**

1) Bouguer's law states that the attenuation due to absorption of radiation is proportional to 1 point

- a. Local intensity  
 b. Thickness of the material  
 c. Transmissivity of the material  
 d. Absorptivity of the material

No, the answer is incorrect.  
Score: 0

Accepted Answers:

a. Local Intensity

2) If  $I_T$  is the total radiation flux received by the glass cover, the amount of radiation flux received by the absorber plate is 1 point

- a.  $I_b r_b + I_d r_d + (I_b + I_d) r_r$   
 b.  $\{I_b r_b + I_d r_d + (I_b + I_d) r_r\} \tau \alpha$   
 c.  $I_b r_b (\tau \alpha)_b + I_d r_d (\tau \alpha)_d + (I_b + I_d) r_r$   
 d.  $I_b r_b \times (\tau \alpha)_b + \{I_d r_d + (I_b + I_d) r_r\} (\tau \alpha)_d$

No, the answer is incorrect.  
Score: 0

Accepted Answers:

d.  $I_b r_b \times (\tau \alpha)_b + \{I_d r_d + (I_b + I_d) r_r\} (\tau \alpha)_d$

3) The absorber of solar collector emits the radiation of wavelengths 1 point

- a.  $0.3 < \lambda < 3 \mu\text{m}$   
 b.  $0 < \lambda < 0.3 \mu\text{m}$   
 c.  $3 < \lambda < 10 \mu\text{m}$   
 d. None of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:

c.  $3 < \lambda < 10 \mu\text{m}$

4) The following data are available for a Flat Plate collector under forced circulation mode of operation: 0 points

Solar insolation available =  $500 \text{ W/m}^2$   
 Transmissivity-absorptivity product = 0.8  
 Overall heat loss co-efficient =  $6.0 \text{ W/m}^2 \text{ } ^\circ\text{C}$   
 Instantaneous thermal efficiency = 15%  
 Fluid inlet temperature =  $60 \text{ } ^\circ\text{C}$   
 Ambient temperature =  $40 \text{ } ^\circ\text{C}$

Using Hottel-Whiller-Bliss equation, the flat plate heat removal factor (FR) is found to be -

- a. 0.0678  
 b. 0.1678  
 c. 0.2678  
 d. 0.3678

No, the answer is incorrect.  
Score: 0

Accepted Answers:

c. 0.2678

5) Transmittance of the window glass depends on 1 point

- a. Area of the glass cover  
 b. Thickness of the glass cover  
 c. Length of the glass cover  
 d. None of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:

b. Thickness of the glass cover

6) Maximum temperature is attained by the absorber plate of a solar thermal system when 1 point

- a. Useful heat gain is zero  
 b. Useful heat gain is maximum  
 c. Useful heat gain is unity  
 d. Heat loss is zero

No, the answer is incorrect.  
Score: 0

Accepted Answers:

a. Useful heat gain is zero

7) Extinction coefficient is property of the cover material. The value of extinction coefficient (per meter) for glass varies from 1 point

- a. Less than 4  
 b. 4 to 25  
 c. More than 25  
 d. Zero

No, the answer is incorrect.  
Score: 0

Accepted Answers:

b. 4 to 25

8) The ratio of the flux absorbed in the absorber plate to the flux incident on the cover system is defined as 1 point

- a. Collector efficiency  
 b. Absorber efficiency  
 c. Transmissivity absorptivity product  
 d. None of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:

c. Transmissivity absorptivity product

9) Instantaneous collection efficiency is given by 1 point

- a. Heat loss by radiation incident on the collector  
 b. Useful heat gain by radiation incident on the collector  
 c. Radiation incident on the collector by heat gain  
 d. None of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:

b. Useful heat gain by radiation incident on the collector

10) The optimum inclination of a Flat Plate Collector for summer conditions is 1 point

- a.  $\Phi - 15$   
 b.  $\Phi + 15$   
 c.  $\Phi$  (latitude)  
 d. All of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:

a.  $\Phi - 15$

Common data for Q11 and Q12

A flat plate collector is made up of a GI absorber plate, GI tubes fixed on the underside and two glass covers. The following data are available:

Refractive index of glass relative to air = 1.526  
 Angle of incidence = 29.37 degree  
 Thickness of each cover = 4 millimeter

Transmissivity equation for two glass covers,

$$\tau_{12} = \frac{1 - \rho_f}{1 + (2M - 1)\rho_f}$$

11) The reflectivity of the two components of polarization are 1 point

- a. 0.0475, 0.0135  
 b. 0.0525, 0.0238  
 c. 0.0567, 0.0313  
 d. 0.0613, 0.0283

No, the answer is incorrect.  
Score: 0

Accepted Answers:

d. 0.0613, 0.0283

12) The transmissivity of the glass cover is 1 point

- a. 0.793  
 b. 0.845  
 c. 0.896  
 d. 1.005

No, the answer is incorrect.  
Score: 0

Accepted Answers:

b. 0.845