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Unit 3 - Week 2

Register for Certification exam

Course outline

How to access the portal

Week 1

Week 2

- View Factor
- Hottel Crossed String Method
- Inside Sphere and Monte Carlo Method
- Radiative Heat Exchange Between Black Surfaces
- Radiative Heat Exchange Between Gray Diffuse Surfaces
- Quiz : Assignment 2
- Solution of Assignment 2

Week 3

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Assignment 2

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

Due on 2019-02-13, 23:59 IST

1) Given two infinite co-axial cylinder of radius R_1 and $R_2 = 2 R_1$. Cylinder 1 is contained inside cylinder 2. The view factor $F_{2\text{-}2}$ is equal to ***1 point***

- 0.5
- 0.25
- 0.75
- 1

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.5

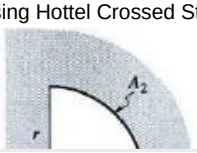
2) Which of the following statements is true for a gray surface? ***1 point***

- Emissivity is more than the emissivity of a black surface
- Absorptivity is less than the absorptivity of a black surface
- Emissivity depends on wavelength
- Emissivity/absorptivity is non-zero in only a small wavelength range

No, the answer is incorrect.
Score: 0

Accepted Answers:
Absorptivity is less than the absorptivity of a black surface

3) Find view factor $F_{1\text{-}2}$ for the configuration shown in the figure (Infinity long perpendicular to paper) using Hottel Crossed String method . Assume all the surfaces are real. ***1 point***



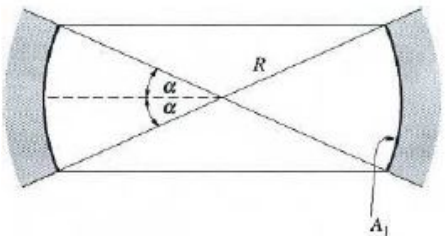
- 0.943
- 0.136

VIDEOS

Text Transcript

0.136

4) The view factor of the spherical ring, shown in the figure, determine view factor $F_{1\text{-}1}$, is (hint: use the inside-sphere method). ***0 points***



- $1-\sin\frac{\alpha}{2}$
- $1-\left(\sin\frac{\alpha}{2}\right)^2$
- $\sin\frac{\alpha}{2}$
- $\sin\alpha$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$\sin\frac{\alpha}{2}$

5) Consider two infinitely long concentric cylinder of problem 1. Assume both the cylinders are isothermal and black with temperature T_1 and T_2, respectively. Assume cylinder 2 is insulated from outside. If T_2 = 500 K and q_2 =200 W/m^2 , then T_1 is approximately: ***1 point***

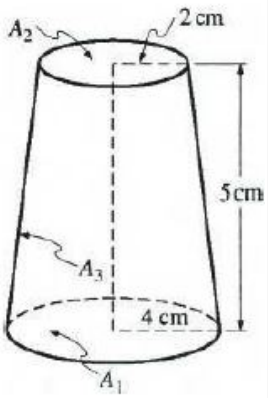
- 492.76 K
- 513.55 K
- 485.27 K
- 506.91 K

No, the answer is incorrect.
Score: 0

Accepted Answers:
485.27 K

6) For the configuration shown in the figure , determine the temperature of surface 2: ***1 point***

Given data
T_1 = 1000 K,
q_1= -1 W/cm2,
ϵ_1 = 0.6;
ϵ_2 = 0.2;
ϵ_3 = 0.3.
All surfaces are gray and diffuse and surface 3 is perfectly insulated.
Assume $F_{1\text{-}2}$ =0.0919



- 1474 K
- 1557 K
- 1603 K

- 1409 K

No, the answer is incorrect.
Score: 0

Accepted Answers:
1474 K

7) Consider a small cubical black-walled enclosure with side 10 cm. The bottom surface is electrically heated to 1500 K, while the side walls are insulated. The top side is exposed to the environment, such that its temperature is 500 K. The heating requirements for the bottom wall is ***1 point***

- 17000 W
- 15000 W
- 1500 W
- 1700 W

No, the answer is incorrect.
Score: 0

Accepted Answers:
1700 W

8) Which of the following is true for metallic surfaces ***1 point***

- The surface emissivity does not depend on direction
- Have very low reflectivity
- Are almost transparent outside a small spectral interval
- Have low emissivity

No, the answer is incorrect.
Score: 0

Accepted Answers:
Have low emissivity

9) Which of the following statements is always true for a diffuse surface ***1 point***

- Has an emissivity of 1
- Emissivity does not depend on wavelength
- Spectral hemispherical emissivity is equal to spectral hemispherical absorptivity
- Total hemispherical emissivity is equal to total hemispherical absorptivity

No, the answer is incorrect.
Score: 0

Accepted Answers:
Spectral hemispherical emissivity is equal to spectral hemispherical absorptivity

10) An isothermal plate (gray surface) at T=300 K with emissivity 0.5 is exposed to normal solar radiation of 1000 W/m^2. The radiosity of the plate surface is ***1 point***

- 629.63 W/m^2
- 729.63 W/m^2
- 640.45 W/m^2
- 780.43 W/m^2

No, the answer is incorrect.
Score: 0

Accepted Answers:
729.63 W/m^2

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