1. What is thermal radiation?

a) Radiation emitted by a substance due to its temperature
b) Conduction of heat through a solid material
c) Heat transfer through a fluid medium
d) Heat transfer by the movement of molecules

Answer: a) Radiation emitted by a substance due to its temperature
Explanation: Thermal radiation is electromagnetic radiation emitted by a substance due to its temperature, without the need for a medium to propagate.

2. Which of the following is a measure of the ability of a surface to emit radiation?

a) Absorptivity
b) Reflectivity
c) Emissive power
d) Transmissivity

Answer: c) Emissive power
Explanation: Emissive power is the rate at which a surface emits thermal radiation per unit area at a given temperature.

3. According to Planck’s distribution law, the spectral distribution of thermal radiation depends on:

a) Temperature of the surface
b) Size of the surface
c) Color of the surface

d) Mass of the surface

Answer: a) Temperature of the surface
Explanation: Planck’s distribution law describes the spectral distribution of thermal radiation emitted by a black body at a given temperature.

4. Which of the following is not a mode of heat transfer associated with thermal radiation?

a) Absorption
b) Convection
c) Reflection
d) Emission

Answer: b) Convection
Explanation: Convection is the transfer of heat through the movement of fluids, while absorption, reflection, and emission are processes associated with thermal radiation.

5. What is the shape factor in radiation heat exchange?

a) A factor determining the shape of an object
b) Ratio of actual heat transfer to the maximum possible heat transfer between two surfaces
c) A measure of the temperature difference between two surfaces
d) A constant value for all surfaces

Answer: b) Ratio of actual heat transfer to the maximum possible heat transfer between two surfaces
Explanation: The shape factor represents the geometric configuration of two surfaces and affects the radiation heat exchange between them.

6. Film-wise and drop-wise condensation refer to:

a) Two different phases of water
b) Methods of heating water
c) Types of condensation processes
d) Techniques for measuring condensation

Answer: c) Types of condensation processes
Explanation: Film-wise condensation occurs when a thin film of liquid forms on a surface, while drop-wise condensation involves individual droplets forming on the surface.

7. Nusselt theory is primarily associated with:

a) Boiling heat transfer
b) Conduction heat transfer
c) Radiation heat transfer
d) Convection heat transfer

Answer: d) Convection heat transfer
Explanation: Nusselt theory provides correlations for calculating convective heat transfer coefficients in different flow regimes.

8. Which of the following is not a regime of boiling heat transfer?

a) Film boiling
b) Pool boiling
c) Forced boiling
d) Nucleate boiling

Answer: c) Forced boiling
Explanation: Forced boiling is not a distinct regime of boiling heat transfer; it typically refers to boiling that occurs under forced convection conditions.

9. What does the term “gray surface” refer to in radiation heat exchange?

a) A surface with uniform temperature distribution
b) A surface with constant emissivity at all wavelengths
c) A surface with high reflectivity
d) A surface with low absorptivity

Answer: b) A surface with constant emissivity at all wavelengths
Explanation: A gray surface is one that emits, absorbs, and reflects radiation uniformly across all wavelengths, regardless of temperature.

10. What is the purpose of a radiation shield?

a) To absorb thermal radiation
b) To reflect thermal radiation
c) To emit thermal radiation
d) To block convection heat transfer

Answer: b) To reflect thermal radiation
Explanation: A radiation shield is designed to reflect thermal radiation away from a surface, reducing heat transfer by radiation.

11. Which law describes the relationship between the emissive power and temperature of a black body?

a) Newton’s law of cooling
b) Planck’s distribution law
c) Stefan-Boltzmann law
d) Boyle’s law

Answer: c) Stefan-Boltzmann law
Explanation: The Stefan-Boltzmann law states that the total emissive power of a black body is proportional to the fourth power of its absolute temperature.

12. Which factor does not affect the rate of thermal radiation emission from a surface?

a) Surface area
b) Surface temperature
c) Surface roughness
d) Surface color

Answer: d) Surface color
Explanation: Surface color does not significantly affect the rate of thermal radiation emission; emissivity, which is related to surface properties, does.

13. What does the term “emissivity” refer to in thermal radiation?

a) The ability of a surface to absorb radiation
b) The ability of a surface to emit radiation
c) The ability of a surface to reflect radiation
d) The ability of a surface to conduct heat

Answer: b) The ability of a surface to emit radiation

Explanation: Emissivity is a measure of the efficiency with which a surface emits thermal radiation compared to an ideal black body.

14. In radiation heat exchange, what does the term “view factor” represent?

a) The fraction of the total surface area that directly faces another surface
b) The angle at which radiation is emitted from a surface
c) The distance between two surfaces
d) The temperature difference between two surfaces

Answer: a) The fraction of the total surface area that directly faces another surface
Explanation: The view factor quantifies the portion of the total radiation leaving one surface that directly reaches another surface.

15. What is the primary mechanism of heat transfer in a vacuum?

a) Conduction
b) Convection
c) Radiation
d) Advection

Answer: c) Radiation
Explanation: Radiation is the only mechanism of heat transfer that can occur in a vacuum since it does not require a medium for propagation.

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