

National Testing Agency

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Convective Heat Transfer Fundamentals and Applications

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Convective Heat Transfer Fundamentals and Applications-1

Section Id :	603489168
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Mandatory or Optional :	Mandatory
Number of Questions :	50
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Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	603489298
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 6034898265 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 2 Wrong Marks : 0

The significance of $\frac{\partial u}{\partial x}$ (u is the velocity in the x -direction) is as follows

- 1. Rotation of the fluid element in the x direction
- 2. Stretching or compression of the fluid element in the x -direction
- 3. Angular deformation of the fluid element in the x direction
- 4. Translation of the fluid element in the x direction

Options :

- 60348931035. 1
- 60348931036. 2
- 60348931037. 3
- 60348931038. 4

Question Number : 2 Question Id : 6034898266 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 2 Wrong Marks : 0

In a two dimensional irrotational, flow (u is the velocity in the x -direction and v is the velocity in the y -direction), the following relation is valid

1. $\frac{\partial u}{\partial y} = \frac{\partial v}{\partial x}$
2. $\frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$
3. $\frac{\partial u}{\partial x} = -\frac{\partial v}{\partial y}$
4. $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$

Options :

60348931039. 1

60348931040. 2

60348931041. 3

60348931042. 4

Question Number : 3 Question Id : 6034898267 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Surface forces acting on the fluid element are caused by

1. Normal stresses, shear stresses and pressure acting on the fluid element
2. Gravity forces, normal stresses, shear stresses acting on the fluid element
3. Shear stresses, Coriolis force, centrifugal force acting on the fluid element
4. Gravity forces, Coriolis forces and centrifugal forces acting on the fluid element

Options :

60348931043. 1

60348931044. 2

60348931045. 3

60348931046. 4

Question Number : 4 Question Id : 6034898268 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In the laminar layer of the three-layer structure of the boundary layer, which one of the following statements is true?

1. Laminar shear stress (τ_{lam}) $\gg$ Turbulent shear stress (τ_{turb})
2. Laminar shear stress (τ_{lam}) $\sim$ Turbulent shear stress (τ_{turb})
3. Laminar shear stress (τ_{lam}) $\ll$ (τ_{turb})
4. None of the above

Options :

60348931047. 1

60348931048. 2

60348931049. 3

60348931050. 4

Question Number : 5 Question Id : 6034898269 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

$\frac{1}{\sqrt{f}} = 2.0 \log(Re\sqrt{f}) - 0.8$ is applicable for

1. Fully developed Laminar flow and hydraulically smooth pipe
2. Fully developed Laminar flow and hydraulically rough pipe
3. Fully developed Turbulent flow and hydraulically smooth pipe
4. Fully developed Turbulent flow and hydraulically rough pipe

Options :

60348931051. 1

60348931052. 2

60348931053. 3

60348931054. 4

Question Number : 6 Question Id : 6034898270 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Time averaging the fluctuating component of the velocity in a turbulent flow is

1. Zero
2. Time averaging the fluctuating component of the velocity is not possible
3. Infinity
4. Same as the mean velocity

Options :

60348931055. 1

60348931056. 2

60348931057. 3

60348931058. 4

Question Number : 7 Question Id : 6034898271 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Natural convection occurs because of the presence of

1. Density difference alone
2. Density difference and gravity
3. Gravity alone
4. Density difference or gravity

Options :

60348931059. 1

60348931060. 2

60348931061. 3

60348931062. 4

Question Number : 8 Question Id : 6034898272 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Consider forced convection for either internal flow and external flows. Which of the following statements are correct?

P. Momentum equation and energy equation are uncoupled

Q. Momentum equation and energy equation are coupled

R. Velocity profile can be obtained from momentum equation and temperature profile can be obtained from energy equation

S. Velocity profile and temperature profile can be obtained by solving both the momentum and energy equation simultaneously

Choose the correct answer from the options given below

1. P and S only
2. Q and R only
3. Q and S only
4. P and R only

Options :

60348931063. 1

60348931064. 2

60348931065. 3

60348931066. 4

Question Number : 9 Question Id : 6034898273 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Natural convection dominates, if

1. Gr/Re^2 is much less than one
2. Gr/Re^2 is much greater than one
3. Gr/Re^2 is equal to one
4. None of the above

Options :

60348931067. 1

60348931068. 2

60348931069. 3

60348931070. 4

Question Number : 10 Question Id : 6034898274 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For low Prandtl number fluids, in natural convection for external surfaces within the thermal boundary layer, it is the balance of which of the following forces?

1. Inertia force and friction force
2. Inertia force and buoyancy force
3. Friction force and buoyancy force
4. Inertia forces, friction force and buoyancy force

Options :

60348931071. 1

60348931072. 2

60348931073. 3

60348931074. 4

Question Number : 11 Question Id : 6034898275 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Which of the following statements is true?

1. Filmwise condensation is preferred over dropwise condensation
2. Dropwise condensation is preferred over filmwise condensation
3. Dropwise condensation and filmwise condensation are equally good
4. None of the above

Options :

60348931075. 1

60348931076. 2

60348931077. 3

60348931078. 4

Question Number : 12 Question Id : 6034898276 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For flow over a flat plate with no suction/blowing, constant u_∞ and $T_w > T_\infty$ for the case of $Pr > 1$, the flow field is split into the following three regions:

Region I: $0 \leq y \leq \delta_t$

Region II: $\delta_t \leq y \leq \delta$

Region III: $y \geq \delta$

Which one of the following is TRUE for Region II?

1. $u(x,y) < u_\infty$ and $T(x,y) > T_\infty$
2. $u(x,y) = u_\infty$ and $T(x,y) = T_\infty$
3. $u(x,y) < u_\infty$ and $T(x,y) = T_\infty$
4. $u(x,y) = u_\infty$ and $T(x,y) > T_\infty$

Options :

60348931079. 1

60348931080. 2

60348931081. 3

60348931082. 4

Question Number : 13 Question Id : 6034898277 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For a flow over a flat plate with no suction or blowing, constant u_∞ , if the velocity profile is $\frac{u}{u_\infty} = A \sin By + C$ the values of A, B and C are respectively:

1. $1, \frac{\pi}{2\delta}, 1$
2. $1, \frac{\pi}{2}, 0$
3. $0.5, \frac{\pi}{2\delta}, 0.5$
4. $1, \frac{\pi}{2\delta}, 0$

Options :

60348931083. 1

60348931084. 2

60348931085. 3

60348931086. 4

Question Number : 14 Question Id : 6034898278 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For a flow over a flat plate with no suction or blowing, constant u_∞ , if the velocity profile is

$\frac{u}{u_\infty} = \sin\left(\frac{\pi y}{2\delta}\right)$; displacement thickness is:

1. $\left(\frac{\pi+2}{\pi}\right)\delta$
2. $\left(\frac{\pi-2}{\pi}\right)\delta$
3. $\frac{2}{3}\delta$
4. $\frac{1}{3}\delta$

Options :

60348931087. 1

60348931088. 2

60348931089. 3

60348931090. 4

Question Number : 15 Question Id : 6034898279 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For a flow over a flat plate with no suction or blowing, constant u_∞ , if the velocity profile is

$\frac{u}{u_\infty} = \sin\left(\frac{\pi y}{2\delta}\right)$, the momentum thickness δ_2 is:

1. $\left(\frac{1}{2}\right)\delta$
2. $\left(\frac{2}{\pi}\right)\delta$
3. $\left(\frac{4+\pi}{2\pi}\right)\delta$
4. $\left(\frac{4-\pi}{2\pi}\right)\delta$

Options :

60348931091. 1

60348931092. 2

60348931093. 3

60348931094. 4

Question Number : 16 Question Id : 6034898280 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For the velocity profile $\frac{u}{u_{\infty}} = 2\eta - \eta^2$ where, $\left[\eta = \frac{y}{\delta(x)}\right]$; the wall shear stress is:

1. $\frac{2\mu u_{\infty}}{\delta}$

2. $\frac{\mu u_{\infty}}{\delta}$

3. 0

4. $\frac{2\mu u_{\infty}}{3\delta}$

Options :

60348931095. 1

60348931096. 2

60348931097. 3

60348931098. 4

Question Number : 17 Question Id : 6034898281 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For flow over a flat plate, the flow velocity is increased by a factor of 4, keeping all other variables constant in case of a laminar flow, the boundary layer thickness _____

1. increases by a factor of 4

2. increases by a factor of 2

3. decreases by a factor of 2

4. decreases by a factor of 4

Options :

60348931099. 1

60348931100. 2

60348931101. 3

60348931102. 4

Question Number : 18 Question Id : 6034898282 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

An incompressible fluid flows between two infinite stationary parallel plates separated by a distance h . The velocity profile is given by $u(y) = U_{max} \left[1 - \left(\frac{2y}{h} \right)^2 \right]$. The y coordinate is measured from the centre of the gap. The average (bulk mean) velocity is equal to

1. $0.5U_{max}$

2. $\frac{U_{max}}{3}$

3. $\frac{2U_{max}}{3}$

4. $\frac{3U_{max}}{4}$

Options :

60348931103. 1

60348931104. 2

60348931105. 3

60348931106. 4

Question Number : 19 Question Id : 6034898283 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For flow over a flat plate, the free stream velocity is increased by a factor of 4, keeping all other variables constant. If fluid has $Pr \ll 1$, which of the following is TRUE?

1. δ and δ_t both decrease
2. δ and δ_t both increase
3. δ decreases and δ_t remains unchanged
4. δ remains unchanged and δ_t decreases

Options :

60348931107. 1

60348931108. 2

60348931109. 3

60348931110. 4

Question Number : 20 Question Id : 6034898284 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In case of fully developed flow through pipes, the heat transfer coefficient

1. Increases continuously
2. Decreases continuously
3. Oscillates about a mean value
4. Remains constant

Options :

60348931111. 1

60348931112. 2

60348931113. 3

60348931114. 4

Question Number : 21 Question Id : 6034898285 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In the fully developed region, for flow through a circular pipe with constant wall temperature, the driving temperature difference, $\Delta T = T_{wall} - T_m(z)$, _____ along the flow direction

1. increases exponentially
2. decreases exponentially
3. remains constant
4. decreases linearly

Options :

60348931115. 1

60348931116. 2

60348931117. 3

60348931118. 4

Question Number : 22 Question Id : 6034898286 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

The following statements are related to laminar and turbulent flows:

Statement I: Wall shear stress for laminar flow is lower than that for turbulent flow

Statement II: Heat transfer coefficient for turbulent flow is lower than that for laminar flow

Which of the following combination are acceptable?

1. Both Statement I and Statement II are false
2. Both Statement I and Statement II are true
3. Statement II is true and Statement I is false
4. Statement I is true and Statement II is false

Options :

60348931119. 1

60348931120. 2

60348931121. 3

60348931122. 4

Question Number : 23 Question Id : 6034898287 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For flow of oil over a flat plate,

1. The thermal boundary layer and velocity boundary layer are of the same thickness at any axial location
2. The thermal boundary layer is always thicker than the velocity boundary layer at any axial location
3. The thermal boundary layer is always thinner than the velocity boundary layer at any axial location
4. Thermal boundary layer thickness is constant in the laminar region and then increases

Options :

60348931123. 1

60348931124. 2

60348931125. 3

60348931126. 4

Question Number : 24 Question Id : 6034898288 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Adiabatic temperature and bulk mean (mixing cup) temperature are equal when

1. No upstream heat sources are powered on
2. No downstream heat sources are powered on
3. Only when single heat source is present in the system
4. All the heat sources but the given heat source are powered off

Options :

60348931127. 1

60348931128. 2

60348931129. 3

60348931130. 4

Question Number : 25 Question Id : 6034898289 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Contact resistance between bare metal surfaces increases when

1. Large warpage exists
2. Loading pressure is low or negligible
3. Extremely smooth surfaces are in contact
4. All of the above

Options :

60348931131. 1

60348931132. 2

60348931133. 3

60348931134. 4

Question Number : 26 Question Id : 6034898290 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Which of the following statements are TRUE?

1. DNB occurs at high quality and Dryout occurs at low quality
2. Decrease in heat transfer coefficient is very severe for dryout when compared to DNB.
3. DNB can be predicted easily in an experiment
4. DNB occurs at low quality and dryout occurs at high quality

Options :

60348931135. 1

60348931136. 2

60348931137. 3

60348931138. 4

Question Number : 27 Question Id : 6034898291 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For a circular pipe whose diameter increases linearly along the flow direction, for a given mass flow rate and constant properties, the Reynolds number of flow_____ along the flow direction. (Assume no flow separation)

1. Decreases
2. Remains constant
3. Increases
4. Increases in the developing region and then remains constant

Options :

60348931139. 1

60348931140. 2

60348931141. 3

60348931142. 4

Question Number : 28 Question Id : 6034898292 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Radiation heat transfer plays a significant role in

1. Film boiling region
2. Subcooled nucleate boiling region
3. Saturated nucleate boiling region
4. Single phase natural convection

Options :

60348931143. 1

60348931144. 2

60348931145. 3

60348931146. 4

Question Number : 29 Question Id : 6034898293 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

The correct sequence of heat transfer processes that occur when heat flux is gradually increased in a pool boiling experiment is

1. Single phase natural convection, subcooled nucleate boiling, CHF, saturated nucleate boiling
2. Subcooled nucleate boiling, saturated nucleate boiling, CHF, single phase natural convection
3. Single phase natural convection, subcooled nucleate boiling, saturated nucleate boiling, CHF
4. CHF, saturated nucleate boiling, subcooled nucleate boiling, single phase natural convection

Options :

- 60348931147. 1
- 60348931148. 2
- 60348931149. 3
- 60348931150. 4

Question Number : 30 Question Id : 6034898294 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Which of the following statements is TRUE with regard to the Overall Heat Transfer Coefficient, U ?

1. For a given geometry and application, U is a constant
2. The overall heat transfer coefficient is equal to the sum of the thermal resistances in the circuit
3. It represents the heat transfer coefficient based on the arithmetic temperature difference, not LMTD.
4. For a given geometry and application, the product UA is a constant

Options :

- 60348931151. 1
- 60348931152. 2
- 60348931153. 3
- 60348931154. 4

Question Number : 31 Question Id : 6034898295 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In saturated nucleate boiling, the total heat transfer coefficient is primarily a result of

1. Nucleation and natural convection
2. Natural convection and forced convection
3. Radiation, forced convection and natural convection
4. Nucleation and forced convection

Options :

60348931155. 1

60348931156. 2

60348931157. 3

60348931158. 4

Question Number : 32 Question Id : 6034898296 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In case of $U_{\infty} = Cx^m$, defined in Similarity method, 'm' is called:

1. Pressure gradient parameter
2. Suction or blowing parameter
3. Viscous dissipation parameter
4. Friction parameter

Options :

60348931159. 1

60348931160. 2

60348931161. 3

60348931162. 4

Question Number : 33 Question Id : 6034898297 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Void fraction in two phase flow is defined as the ratio of

1. Volume occupied by the gas phase to that occupied by the liquid phase
2. Volume occupied by the liquid phase to that occupied by the gas phase
3. Volume occupied by the liquid phase to the total volume
4. Volume occupied by the gas phase to the total volume

Options :

60348931163. 1

60348931164. 2

60348931165. 3

60348931166. 4

Question Number : 34 Question Id : 6034898298 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In the Falkner Skan solution by similarity method, the wedge central angle was given by $\pi\beta$.
Match the columns appropriately:

Value of β	Flow Situation
P. $\beta = 0$	1. Stagnation point flow
Q. $\beta = 1$	2. flow separation
R. $\beta = -0.2$	3. flow over a flat plate
	4. flow over a backward facing plate

Choose the **correct** answer from the options given below:

1. P- 3, Q- 1, R- 4
2. P- 3, Q- 1, R- 2
3. P- 3, Q- 2, R- 1
4. P- 2, Q- 3, R- 1

Options :

60348931167. 1

60348931168. 2

60348931169. 3

60348931170. 4

Question Number : 35 Question Id : 6034898299 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In similarity analysis, the similarity variable was defined as $\eta = y \sqrt{\frac{U_{\infty}}{\nu x}}$. For the flow of the same fluid over a flat plate, consider the following cases:

Case P	Case Q
$\eta = 3.45$	$\eta = 3.45$
$U_{\infty} = U_{\infty,1}$	$U_{\infty} = U_{\infty,2}$
$y = y_1$	$y = y_2$
$x = x_1$	$x = x_1$

The value of $\frac{y_2}{y_1}$, if $U_{\infty,2} = 4 \times U_{\infty,1}$ is

1. 2
2. 0.5
3. 0.25
4. 4

Options :

60348931171. 1

60348931172. 2

60348931173. 3

60348931174. 4

Question Number : 36 Question Id : 6034898300 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

A concentric multi-cylinder geometry comprising two circular pipes and insulation on the outside has the combined thermal resistances to be 0.001 K/W. The outermost surface is 0.1 m², while the innermost surface area is 0.025 m². The product UA (in W/K), based on the innermost surface area would be

1. 10000
2. 40000
3. 1000
4. 250

Options :

60348931175. 1

60348931176. 2

60348931177. 3

60348931178. 4

Question Number : 37 Question Id : 6034898301 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

An experiment revealed that $\overline{Nu}_L = CRe_L^{0.5}Pr^n$. If the velocity of the flow is increased by a factor of 4, the ratio of the new Nusselt number to the original value is

1. 2
2. 0.25
3. 4
4. 0.5

Options :

60348931179. 1

60348931180. 2

60348931181. 3

60348931182. 4

Question Number : 38 Question Id : 6034898302 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

From the group of characteristics listed below, choose all that apply to Dryout

- A. High quality
- B. Low quality
- C. Low heat flux
- D. High heat flux
- E. Very severe reduction in heat transfer coefficient
- F. Not so severe reduction in heat transfer coefficient

Choose the correct answer from the options given below

- 1. A, D and F only
- 2. A, C and F only
- 3. A, C and E only
- 4. B, C and F only

Options :

60348931183. 1

60348931184. 2

60348931185. 3

60348931186. 4

Question Number : 39 Question Id : 6034898303 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

List of processes and important points that occur in a boiling curve are given below.

P-Single phase Natural convection

Q- Saturated nucleate boiling

R-CHF

S-Transition boiling

T-Leidenfrost point

V-Film boiling

Which of the following represents correct sequence of processes that occur in a boiling curve for wall temperature controlled case with progressively decreasing wall temperature?

1. V-T-Q-P
2. V-T-S-Q-P
3. V-T-S-R-Q-P
4. V-R-Q-P

Options :

60348931187. 1

60348931188. 2

60348931189. 3

60348931190. 4

Question Number : 40 Question Id : 6034898304 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For heat pipe to operate in an effective manner,

1. Heat transfer rates of evaporator and condenser should be same
2. Temperature difference between condenser and evaporator should be high enough to overcome pressure drop
3. Evaporator saturation temperature should be low
4. None of the above

Options :

60348931191. 1

60348931192. 2

60348931193. 3

60348931194. 4

Question Number : 41 Question Id : 6034898305 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Eddy momentum diffusivity is a

1. Fluid property
2. Flow parameter
3. Both fluid property and flow parameter
4. Neither fluid property nor flow parameter

Options :

60348931195. 1

60348931196. 2

60348931197. 3

60348931198. 4

Question Number : 42 Question Id : 6034898306 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In a wind tunnel, there are contraction cones and screens of various mesh sizes. They essentially

1. Increase turbulence intensity values
2. have no influence on the turbulence intensity
3. Lessen turbulence intensity values
4. None of the above

Options :

60348931199. 1

60348931200. 2

60348931201. 3

60348931202. 4

Question Number : 43 Question Id : 6034898307 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In general, in natural convection for external surfaces, it is the balance of which of the following forces?

1. Inertia force and Friction force
2. Inertia force and Buoyancy force
3. Friction force and Buoyancy force
4. Inertia forces, Friction force and Buoyancy force

Options :

60348931203. 1

60348931204. 2

60348931205. 3

60348931206. 4

Question Number : 44 Question Id : 6034898308 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In the Nusselt condensation, no temperature gradient is assumed in the vapour. In the background of this, which of the following statement is TRUE?

1. Heat transfer to the liquid vapour interface can occur only by condensation at the interface and not by conduction from the vapour
2. Heat transfer to the liquid vapour interface can occur not only by condensation at the interface and also by conduction from the vapour
3. Heat transfer to the liquid vapour interface can occur not by condensation at the interface and but only by conduction from the vapour
4. None of the above

Options :

60348931207. 1

60348931208. 2

60348931209. 3

60348931210. 4

Question Number : 45 Question Id : 6034898309 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

A heat sink with a chimney performs better than a heat sink without it under optimal conditions. A chimney improves heat sink performance because it:

1. Increases the surface area
2. Reduces obstruction of the flow
3. Augments heat transfer
4. Increases free convective velocities

Options :

60348931211. 1

60348931212. 2

60348931213. 3

60348931214. 4

Question Number : 46 Question Id : 6034898310 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Consider a paraffin wax cuboid of 1 cm each. A cuboid of wax is at a melting point of 35 °C, initially. Density, Latent heat of melting and Thermal conductivity of wax is specified as 800 kg/m³, 250 kJ/kg and 0.23 W/mK, respectively. Assuming negligible sensible heating and overall heat input to the domain as 10 W, the total time for melting, is

1. 2000 s
2. 1500 s
3. 2500 hours
4. 2000 minutes

Options :

60348931215. 1

60348931216. 2

60348931217. 3

60348931218. 4

Question Number : 47 Question Id : 6034898311 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Consider natural convection around a vertical hot plate maintained at constant temperature surrounded by a low Prandtl number fluid, the distance from the wall to the velocity peak is

1. $\left(HRa_H^{-\frac{1}{2}}\right)$
2. $Pr^{-\frac{1}{2}}\left(HRa_H^{-\frac{1}{4}}\right)$
3. $\left(HRa_H^{-\frac{1}{4}}\right)$
4. $Pr^{\frac{1}{4}}\left(HRa_H^{-\frac{1}{4}}\right)$

Options :

60348931219. 1

60348931220. 2

60348931221. 3

60348931222. 4

Question Number : 48 Question Id : 6034898312 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

In internal flows, for a case with constant heat flux, which of the following is TRUE?

1. Under thermally fully developed condition, the wall temperature remains constant
2. Under thermally fully developed condition, the bulk mean temperature remains constant
3. Under thermally fully developed condition, the non-dimensional temperature profile remains constant
4. Under thermally fully developed condition, the hydrodynamic and thermal boundary layers merge.

Options :

60348931223. 1

60348931224. 2

60348931225. 3

60348931226. 4

Question Number : 49 Question Id : 6034898313 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

Which of the following statements is TRUE, in case of flow through a circular pipe of constant diameter?

1. If flow is hydrodynamically fully developed, it means it is thermally fully developed
2. If flow is thermally fully developed, it is hydrodynamically fully developed.
3. Flow never becomes thermally fully developed in case of constant wall temperature boundary condition
4. Flow becomes thermally fully developed only for fluids with $Pr = 1$.

Options :

60348931227. 1

60348931228. 2

60348931229. 3

60348931230. 4

Question Number : 50 Question Id : 6034898314 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 2 Wrong Marks : 0

For Reynolds analogy to be valid, some of the conditions required are listed

P. Prandtl number must be equal to 1

Q. Pressure gradient term must be nearly zero

R. Viscous dissipation must be negligible

Which of these must be valid?

1. Only P and Q
2. Only P and R
3. Only Q and R
4. All of P, Q and R

Options :

60348931231. 1

60348931232. 2

60348931233. 3

60348931234. 4