Assignment 7

The due date for submitting this assignment has passed.

As per course records you have not submitted this assignment.

There may be multiple select questions.

1. What is Boussinesq approximation? (1 point)
   - It ignores density variation everywhere except in buoyancy term
   - It ignores density variation everywhere except in conduction term
   - It ignores density variation everywhere
   - It ignores density variation everywhere except in buoyancy term and conduction term

   No, the answer is incorrect.
   Accepted Answers:
   - It ignores density variation everywhere except in buoyancy term
   - It ignores density variation everywhere except in conduction term
   - It ignores density variation everywhere
   - It ignores density variation everywhere except in buoyancy term and conduction term

2. The Rayleigh number is a function of seven parameters given by $Ra = \frac{\alpha \beta \gamma \delta \epsilon \zeta \eta}{\theta \varphi}$, where $\alpha$ is the temperature gradient, $\beta$ is the magnitude of thermal diffusivity, $\gamma$ is the density of the system, $\delta$ is the thermal effusivity and $\epsilon$ is the coefficient of convective resistance. What will be the i-th and j-th of all?
   - $i$-th: $\alpha$, $j$-th: $\beta$
   - $i$-th: $\gamma$, $j$-th: $\delta$
   - $i$-th: $\zeta$, $j$-th: $\eta$
   - $i$-th: $\theta$, $j$-th: $\varphi$

   No, the answer is incorrect.
   Accepted Answers:
   - $i$-th: $\alpha$, $j$-th: $\beta$
   - $i$-th: $\gamma$, $j$-th: $\delta$
   - $i$-th: $\zeta$, $j$-th: $\eta$
   - $i$-th: $\theta$, $j$-th: $\varphi$

3. For Rayleigh-Benard convection, which one of the following statement is correct? (1 point)
   - System crosses from stable, unstable and stable regimes as we increase horizontal wavenumber $k$
   - System crosses from unstable, stable and unstable regimes as we increase horizontal wavenumber $k$
   - System crosses from stable to unstable regime as we increase horizontal wavenumber $k$
   - System crosses from unstable to stable regime as we increase horizontal wavenumber $k$

   No, the answer is incorrect.
   Accepted Answers:
   - System crosses from stable to unstable regime as we increase horizontal wavenumber $k$

4. If the temperature of a gas mixing cloud is increased by 1%, what will happen to its speed along z?
   - If increases by 2.6%
   - If increases by 1.44%
   - If increases by 2.4%
   - It decreases by 1.44%

   No, the answer is incorrect.
   Accepted Answers:
   - It decreases by 1.44%

5. The main problem of James' original instability analysis [James (1953)] was
   - the consideration of a hydrostatic model
   - the neglect of the effect of convection
   - the violation of new unique solutions of the linear perturbation equations
   - to consider a uniform and non-stratified gas at the unperturbed state

   No, the answer is incorrect.
   Accepted Answers:
   - to consider a uniform and non-stratified gas at the unperturbed state

6. Generalised Benard's Marangoni is said to be
   - any point in the steady flow only
   - any point in the steady flow only if and only if zero is a local stability
   - any point in the steady flow only if and only if zero is locally unstable
   - any point in the steady flow only if and only if zero is locally unstable and at any point in the flow

   No, the answer is incorrect.
   Accepted Answers:
   - any point in the steady flow only if and only if zero is locally unstable

7. To relate the dispersion relation for propagation of disturbances at the interface between two fluid medium, one of the basic condition on pressure at fluid interface is
   - must be finite pressure gradient across the interface
   - must be finite pressure gradient across the interface and pressure must be continuous across the interface
   - pressure must be continuous across the interface and pressure must be continuous across the interface
   - must be finite pressure gradient across the interface and pressure must be continuous across the interface

   No, the answer is incorrect.
   Accepted Answers:
   - must be finite pressure gradient across the interface and pressure must be continuous across the interface

8. If a fluid at rest is suddenly subject to a static fluid which is 2.5 times heavier than the upper fluid, then the phase velocity of the corresponding surface gravity wave is given by
   - $\sqrt{g \lambda}$
   - $\sqrt{g \lambda}$
   - $\sqrt{g \lambda}$
   - $\sqrt{g \lambda}$

   No, the answer is incorrect.
   Accepted Answers:
   - $\sqrt{g \lambda}$

9. Which of the following statement is correct?
   - Rayleigh-Taylor instability is obtained at the two static fluid interface with the heavier fluid lies above the lighter fluid
   - Kelvin-Helmholtz instability is obtained at the two static fluid interface with the heavier fluid lies above the lighter fluid
   - Rayleigh-Taylor instability is obtained at the two moving fluid interface with the heavier fluid lies above the lighter fluid
   - Kelvin-Helmholtz instability is obtained at the two static fluid interface with the heavier fluid lies above the lighter fluid

   No, the answer is incorrect.
   Accepted Answers:
   - Rayleigh-Taylor instability is obtained at the two static fluid interface with the heavier fluid lies above the lighter fluid

10. Which type of instability can be found at the initial phase of supernova explosion? (1 point)
    - Kelvin-Helmholtz
    - Rayleigh-Taylor
    - Convective instability
    - None of the above

    No, the answer is incorrect.
    Accepted Answers:
    - Rayleigh-Taylor

Due on 2021-03-10, 23:59 IST.