Unit 13 - Week 11: Finite volume method - II

Assignment 11

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

Due on 2020-04-15, 23:59 IST.

1) Which one of the following represents two-dimensional unsteady energy equation with constant properties without any source term? *1 point*

- $\rho\left[\frac{\partial(uT)}{\partial x}+\frac{\partial(vT)}{\partial y}\right]=k\left(\frac{\partial^2 T}{\partial x^2}+\frac{\partial^2 T}{\partial y^2}\right)$
- $\rho\left[\frac{\partial T}{\partial t}+\frac{\partial(uT)}{\partial x}+\frac{\partial(vT)}{\partial y}\right]=k\left(\frac{\partial^2 T}{\partial x^2}+\frac{\partial^2 T}{\partial y^2}\right)$
- $\rho C_p\left[\frac{\partial T}{\partial t}+\frac{\partial(uT)}{\partial x}+\frac{\partial(vT)}{\partial y}\right]=k\left(\frac{\partial^2 T}{\partial x^2}+\frac{\partial^2 T}{\partial y^2}\right)$
- $\rho C_p\left[\frac{\partial T}{\partial t}+\frac{\partial T}{\partial x}+\frac{\partial T}{\partial y}\right]=k\left(\frac{\partial^2 T}{\partial x^2}+\frac{\partial^2 T}{\partial y^2}\right)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\rho C_p\left[\frac{\partial T}{\partial t}+\frac{\partial(uT)}{\partial x}+\frac{\partial(vT)}{\partial y}\right]=k\left(\frac{\partial^2 T}{\partial x^2}+\frac{\partial^2 T}{\partial y^2}\right)$

2) The convective flux vector in convection-diffusion for general variable ϕ is represented as *1 point*

- $\rho\mathbf{u}\phi-\Gamma\nabla\phi$
- $\rho\mathbf{u}\phi+\Gamma\nabla\phi$
- $\rho\mathbf{u}\phi$
- $-\Gamma\nabla\phi$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\rho\mathbf{u}\phi$

3) The diffusion flux in east face center with central difference scheme for uniform grid can be written as *1 point*

- $\mathbf{J}_e\cdot\mathbf{S}_e=\rho u_e A_e\frac{\phi_E+\phi_P}{2}-\Gamma_e A_e\frac{\phi_P-\phi_E}{\Delta x}$
- $\mathbf{J}_e\cdot\mathbf{S}_e=\rho u_e A_e\frac{\phi_E+\phi_P}{2}-\Gamma_e A_e\frac{\phi_E-\phi_P}{\Delta x}$
- $\mathbf{J}_e\cdot\mathbf{S}_e=\rho u_e A_e\frac{\phi_E-\phi_P}{2}-\Gamma_e A_e\frac{\phi_E-\phi_P}{\Delta x}$
- $\mathbf{J}_e\cdot\mathbf{S}_e=\rho u_e A_e\frac{\phi_E-\phi_P}{2}-\Gamma_e A_e\frac{\phi_P-\phi_E}{\Delta x}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\mathbf{J}_e\cdot\mathbf{S}_e=\rho u_e A_e\frac{\phi_E+\phi_P}{2}-\Gamma_e A_e\frac{\phi_E-\phi_P}{\Delta x}$

4) The net mass outflow from the two-dimensional cell P is *1 point*

- $\sum F_f=\rho u_e A_e+\rho u_w A_w+\rho u_n A_n+\rho u_s A_s$
- $\sum F_f=\rho u_e A_e-\rho u_w A_w+\rho u_n A_n-\rho u_s A_s$
- $\sum F_f=\rho u_e A_e+\rho u_w A_w+\rho v_n A_n+\rho v_s A_s$
- $\sum F_f=\rho u_e A_e-\rho u_w A_w+\rho v_n A_n-\rho v_s A_s$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\sum F_f=\rho u_e A_e-\rho u_w A_w+\rho v_n A_n-\rho v_s A_s$

5) In the final discretized equation of two-dimensional convection-diffusion equation using first-order upwind scheme, the coefficient a_w is *0 points*

- $D_w-[|F_w,0|]$
- $D_w+[|F_w,0|]$
- $D_w-[|-F_w,0|]$
- $D_w+[|-F_w,0|]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$D_w-[|F_w,0|]$

6) Which one of the following is correct? *1 point*

- The Scarborough criterion is used as a necessary condition for convergent iterative method.
- The Scarborough criterion is used as a sufficient condition for convergent iterative method.
- The Scarborough criterion is used as both sufficient and necessary conditions for convergent iterative method
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
The Scarborough criterion is used as a sufficient condition for convergent iterative method.

7) Quadratic Upstream Interpolation for Convective Kinematics scheme is second order accurate in space. *1 point*

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers:
False

8) For fluid flow problem, the cell Peclet number is also known as cell Reynolds number. *1 point*

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers:
True