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NPTEL

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Courses » **Computational Hydraulics**

Announcements **Course** Forum Progress Mentor

Unit 3 - Week 2

Course outline

How to access the portal

Week 1

Week 2

- Lecture 6: Finite Difference Approximation
- Lecture 7: Ordinary Differential Equation : IVP
- Lecture 8: Ordinary Differential Equation : BVP
- Lecture 9 Partial Differential Equation : BVP
- Lecture 10: Partial Differential Equation : IBVP
- Week 2: Lecture Material
- Quiz : Week 2: Assignment
- Feedback for week 2
- Assignment-2 Solution

Week 3

Week 4

Week 5

Week 6

Week 7

Week 2: Assignment

The due date for submitting this assignment has passed. **Due on 2017-08-23, 23:59 IST.**

Submitted assignment

1) Order of truncation error for Crank-Nicolson method in case of IBVP problem *1 point*

- First order in space and second order in time
- First order in space and first order in time
- second order in space and First order in time
- second order in space and second order in time

No, the answer is incorrect.
Score: 0

Accepted Answers:
second order in space and second order in time

2) Arrange the following methods according to order of truncation error (higher to lower) for IVP *1 point*
(a) Euler method
(b) Fourth order Runge-Kutta
(c) Modified Euler method

- a-b-c
- a-c-b
- b-a-c
- b-c-a
- c-a-b
- c-b-a

No, the answer is incorrect.
Score: 0

Accepted Answers:
b-c-a

3) Identify the two-step IVP method *1 point*

- Backward Euler method
- Euler Cauchy method
- Second order Runge-Kutta method

No, the answer is incorrect.
Score: 0

Accepted Answers:
Euler Cauchy method
Second order Runge-Kutta method

4) Identify the correct discretization for ϕ'' *1 point*

Week 8

Week 9

Week 10

Week 11

Week 12

$$\phi_i'' = \frac{\phi_i - 2\phi_{i+1} + \phi_{i+2}}{\Delta x^2} + \mathcal{O}(\Delta x)$$

$$\phi_i'' = \frac{\phi_i - 2\phi_{i+1} + \phi_{i+2}}{\Delta x^2} + \mathcal{O}(\Delta x^2)$$

$$\phi_i'' = \frac{\phi_i - 3\phi_{i+1} + 2\phi_{i+2}}{\Delta x^2} + \mathcal{O}(\Delta x)$$

$$\phi_i'' = \frac{\phi_i - 3\phi_{i+1} + 2\phi_{i+2}}{\Delta x^2} + \mathcal{O}(\Delta x^2)$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\phi_i'' = \frac{\phi_i - 2\phi_{i+1} + \phi_{i+2}}{\Delta x^2} + \mathcal{O}(\Delta x)$$

5) Consistency is the property of *1 point*

- Mesh/grid size
- Discretization

No, the answer is incorrect.
Score: 0

Accepted Answers:
Discretization

6) Accuracy of any problem depends on *1 point*

- accuracy of the discretization of differential equation
- accuracy of the discretization of boundary conditions
- accuracy of the discretization of differential equation and boundary conditions
- none of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
accuracy of the discretization of differential equation and boundary conditions

7) Differential equation with only spatial derivatives is called as *1 point*

- boundary value problem
- initial boundary value problem
- initial value problem

No, the answer is incorrect.
Score: 0

Accepted Answers:
boundary value problem

8) Explicit or Implicit scheme depends on *1 point*

- time derivative
- time level of time derivative
- time level of space derivatives

No, the answer is incorrect.
Score: 0

Accepted Answers:
time level of space derivatives

9) Boundary Value Problems (BVP) can be solved as *1.5 points*

- initial boundary value problem with arbitrary initial condition
- initial value problem with arbitrary initial condition

none of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
initial boundary value problem with arbitrary initial condition

10) The following differential equation with a general variable (ϕ) ***1 point***

$\frac{\partial^2 \phi(x)}{\partial x^2} + \frac{\phi_0 - \phi(x)}{\lambda} = 0$ can be discretized as, (ϕ_0 and λ are constants)

- $\frac{\lambda}{\Delta x^2}\phi_{i-1} + (1 + \frac{2\lambda}{\Delta x^2})\phi_i + \frac{\lambda}{\Delta x^2}\phi_{i+1} = -\phi_0$
- $\frac{\lambda}{\Delta x^2}\phi_{i-1} - (1 - \frac{2\lambda}{\Delta x^2})\phi_i + \frac{\lambda}{\Delta x^2}\phi_{i+1} = -\phi_0$
- $\frac{\lambda}{\Delta x^2}\phi_{i-1} - (1 + \frac{2\lambda}{\Delta x^2})\phi_i + \frac{\lambda}{\Delta x^2}\phi_{i+1} = -\phi_0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{\lambda}{\Delta x^2}\phi_{i-1} - (1 + \frac{2\lambda}{\Delta x^2})\phi_i + \frac{\lambda}{\Delta x^2}\phi_{i+1} = -\phi_0$

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