

Unit 9 - Week 6

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Assignment 6

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

Due on 2019-09-11, 23:59 IST.

1) For the differential equation $L\phi(r) = f(r)$ with basis function $b_m(r)$ with support Ω_m , the weighted residual method implies that: 1 point

- $\int_{\Omega_m} [L\phi(r) - b_m(r)f(r)]dr = 0$
 $\int_{\Omega_m} [L\phi(r) + b_m(r)f(r)]dr = 0$
 $\int_{\Omega_m} b_m(r)[L\phi(r) - f(r)]dr = 0$
 $\int_{\Omega_m} b_m(r)[L\phi(r) + f(r)]dr = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\int_{\Omega_m} b_m(r)[L\phi(r) - f(r)]dr = 0$

2) In the 1-D FEM, the first derivative of left and right Lagrange basis functions $N_1(x)$ and $N_2(x)$ in the segment $x_1 < x < x_2$, are given by (where $N_1(x_1) = 1, N_2(x_2) = 1$): 1 point

- $x_2/(x_2 - x_1), x_1/(x_2 - x_1)$
 $x_1/(x_2 - x_1), x_2/(x_2 - x_1)$
 $1/(x_2 - x_1), -1/(x_2 - x_1)$
 $-1/(x_2 - x_1), 1/(x_2 - x_1)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $-1/(x_2 - x_1), 1/(x_2 - x_1)$

3) Consider the 2-D basis function defined by the equation below: 1 point

$$N_1^T(x, y) = \frac{(x_2 y_3 - x_3 y_2) - x(y_3 - y_2) + y(x_3 - x_2)}{(x_2 y_3 - x_3 y_2) - x_1(y_3 - y_2) + y_1(x_3 - x_2)}$$

The value of the function at point (x_2, y_2) is given by

- 1
 0
 1
 2

No, the answer is incorrect.
Score: 0

Accepted Answers:
0

4) The expression for Dirichlet boundary condition is given by 1 point

- $U(x) = const.$
 $\frac{dU}{dx} = const.$
 $\frac{d^2U}{dx^2} = const.$
 $\frac{dU}{dx} = const. \times U(x)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $U(x) = const.$

5) The expression for Neumann boundary condition is given by 1 point

- $U(x) = const.$
 $\frac{dU}{dx} = const.$
 $\frac{d^2U}{dx^2} = const.$
 $\frac{dU}{dx} = const. \times U(x)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\frac{dU}{dx} = const.$

6) The expression for Robin boundary condition is given by 1 point

- $U(x) = const.$
 $\frac{dU}{dx} = const.$
 $\frac{d^2U}{dx^2} = const.$
 $\frac{dU}{dx} = const. \times U(x)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\frac{dU}{dx} = const. \times U(x)$

7) What is the final form of the system matrix obtained after assembling the elements in 1D FEM? 1 point

- Diagonal
 Tridiagonal
 Dense
 Circulant
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Tridiagonal

8) **Statement A:** FEM is more computationally efficient than the Integral Equation method
Statement B: FEM results in a sparse system matrix 1 point

- Both statements are correct and Statement B is the correct reason for Statement A
 Both statements are correct but Statement B is not the correct reason for Statement A
 Only Statement A is correct
 Only Statement B is correct
 Both Statement A and Statement B are wrong

No, the answer is incorrect.
Score: 0

Accepted Answers:
Both statements are correct and Statement B is the correct reason for Statement A

9) What is the computational complexity of solving the 1D FEM system of equations? 1 point

- $O(n)$
 $O(n^2)$
 $O(n^3)$
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $O(n)$

10) The matrix equation formulated for the 1D FEM, where we solve the scattering problem and apply radiation boundary conditions, is of the form $Ax = b$. **Statement A:** The vector b has only two non zero elements 1 point
Statement B: The non zero elements occur due to the radiation boundary condition

- Only Statement A is correct
 Only Statement B is correct
 Both statements are correct and Statement B is the correct reason for Statement A
 Both Statement A and Statement B are wrong

No, the answer is incorrect.
Score: 0

Accepted Answers:
Both statements are correct and Statement B is the correct reason for Statement A