Unit 9 - Week 6

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***

$$N_1^e(x, y) = \frac{(x_2y_3 - x_3y_2) - x(y_3 - y_2) + y(x_3 - x_2)}{(x_2y_3 - x_3y_2) - x_1(y_3 - y_2) + y_1(x_3 - x_2)}$$

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 ***1 point***
Statement B: FEM results in a sparse system matrix

- 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 $Ax = b$. ***1 point***
Statement A: The vector b has only two non zero elements
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