

**19ASB304 - COMPUTATIONAL FLUID DYNAMICS FOR AEROSPACE
APPLICATION**

Question Bank

UNIT III - FINITE ELEMENT TECHNIQUES

Part A – 2 Mark Questions (*Remembering, Understanding, and Applying Levels*)

1. What is the Finite Element Method (FEM)? (*Remembering*)
2. Define strong and weak formulations in FEM. (*Understanding*)
3. What is a boundary value problem (BVP) in computational fluid dynamics? (*Understanding*)
4. Explain the concept of weighted residual formulation. (*Understanding*)
5. What is the Galerkin method in FEM? (*Applying*)
6. Define variational formulation in FEM. (*Understanding*)
7. What are piecewise defined shape functions? (*Understanding*)
8. List the steps involved in the FEM solution procedure. (*Remembering*)
9. How does weak formulation differ from strong formulation? (*Analyzing*)
10. What is the importance of FEM in computational fluid dynamics? (*Understanding*)

Part B – 16 Mark Questions (*Applying, Analyzing, Evaluating, and Creating Levels*)

1. Explain in detail the strong and weak formulations of a boundary value problem. (*Applying*)
2. Discuss the weighted residual formulation in FEM and derive its governing equations. (*Analyzing*)
3. Describe the Galerkin formulation method and its application in CFD. (*Applying*)
4. Compare strong and weak formulations, explaining their advantages and limitations. (*Analyzing*)
5. Illustrate the variational formulation in FEM with an example. (*Applying*)
6. Explain the concept of piecewise defined shape functions and their role in FEM. (*Applying*)
7. Discuss the step-by-step implementation of FEM for solving fluid flow problems. (*Applying*)

8. Evaluate the advantages of FEM over other numerical methods like FDM and FVM.
(*Evaluating*)
9. Develop a computational approach using FEM for solving a simple boundary value problem. (*Creating*)
10. Critically assess the limitations of the finite element method in CFD applications and propose improvements. (*Evaluating*)