19ASB304 - COMPUTATIONAL FLUID DYNAMICS FOR AEROSPACE APPLICATION

Question Bank

UNIT IV - FINITE VOLUME TECHNIQUES

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

1. What is the Finite Volume Method (FVM)? *(Remembering)*
2. Define cell-centered formulation in FVM. *(Understanding)*
3. What is Lax-Wendroff time stepping? *(Understanding)*
4. Explain Runge-Kutta time stepping in numerical methods. *(Understanding)*
5. What is multi-stage time stepping? *(Applying)*
6. Define accuracy in cell vertex formulation. *(Understanding)*
7. Differentiate between cell-centered and cell-vertex formulations. *(Analyzing)*
8. What are FDM-like finite volume techniques? *(Understanding)*
9. Explain central vs upwind-type discretization. *(Applying)*
10. What is the role of derivative treatment in finite volume techniques? *(Understanding)*

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

1. Explain the finite volume method (FVM) and its advantages over other numerical techniques. *(Applying)*
2. Describe the cell-centered formulation and derive its governing equations. *(Analyzing)*
3. Explain in detail the Lax-Wendroff time stepping method and its application in CFD. *(Applying)*
4. Discuss the Runge-Kutta time stepping method and compare its stages. *(Analyzing)*
5. Illustrate multi-stage time stepping and its significance in numerical solutions. *(Applying)*
6. Compare cell-vertex and cell-centered formulations in terms of accuracy and stability. *(Evaluating)*
7. Explain the concept of FDM-like finite volume techniques and their applications. *(Applying)*

8. Analyze the differences between central and upwind-type discretization techniques. *(Analyzing)*

9. Derive the governing equations for derivative treatment in finite volume methods. *(Creating)*

10. Critically evaluate the advantages and limitations of multi-stage time stepping in CFD. *(Evaluating)*