19ASB304 - COMPUTATIONAL FLUID DYNAMICS FOR AEROSPACE APPLICATION

Question Bank

UNIT V - FLOW FIELD ANALYSIS AND TURBULENCE MODELS

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

1. What is pressure correction in CFD? *(Understanding)*
2. Define the SIMPLE algorithm. *(Remembering)*
3. What is the purpose of the pressure correction equation? *(Understanding)*
4. Differentiate between SIMPLE and PISO algorithms. *(Analyzing)*
5. What are the main types of turbulence models? *(Remembering)*
6. Define algebraic mixing length model in turbulence modeling. *(Understanding)*
7. What is the difference between one-equation and two-equation turbulence models? *(Analyzing)*
8. Explain the significance of high and low Reynolds number turbulence models. *(Applying)*
9. What are the key challenges in modeling stage separation aerodynamics? *(Understanding)*
10. Mention one future space transport system and its aerodynamic consideration. *(Applying)*

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

1. Derive the pressure correction equation and explain its role in CFD simulations. *(Applying)*
2. Describe the SIMPLE algorithm with a flowchart and explain its working principle. *(Applying)*
3. Compare the SIMPLE, SIMPLEC, and SIMPLER algorithms, highlighting their differences. *(Analyzing)*
4. Explain the PISO algorithm in detail and compare it with SIMPLE. *(Applying)*
5. Analyze the advantages and limitations of different turbulence models in CFD. *(Evaluating)*

6. Discuss the algebraic mixing length model and its applications in fluid flow analysis. *(Analyzing)*

7. Explain the working principles of one-equation and two-equation turbulence models with examples. *(Applying)*

8. Compare high and low Reynolds number turbulence models and their suitability for different applications. *(Evaluating)*

9. Conduct a case study on stage separation aerodynamics in future space transport systems. *(Creating)*

10. Critically evaluate the challenges in CFD modeling of aerodynamic flow in space transport systems. *(Evaluating)*