

Group A (Each question Carry 1 Mark)	
1	The region of interest for analysis in CFD is called a) Cell; b) domain c) range d) node
2	Which of these will be optimal mesh? a) Non-uniform, b) uniform, c) grids with increasing length, d) grids with decreasing length
3	The solution in CFD is obtained at different points within the zone of interest. These points are known as a) Grids; b) elements; c) nodes; d) cells;
4	A nonlinear partial differential equation (related to fluid flow) can be solved using CFD by following method. a) Direct; b) iterative; c) analytical d) none of these
5	Heat flows through an iron rod (radially insulated). One end is open to a heat source, where heat flux is constant. This kind of boundary condition is known as a) Dirichlet bc; b) Neumann bc; c) mixed bc; b) none of these
6	Which of these will not come under the three main elements of CFD packages? a) Pre-processor; b) Post-processor; c) Code creator; d) Solver
7	Which of these will fall into the post-processing category? a) Definition of boundary conditions; b) Grid generation; c) Flow visualization; d) Discretization;
8	CFD can give _____ results than experiments. a) Detailed; b) Accurate; c) Reliable; d) Approximate
9	Initial conditions are used for _____ problems. a) time-dependent problems; b) boundary value problems; c) Steady state problems; d) none of these;
10	The mass flux out should be equal to the mass flux in. This is mathematically expressed by _____ a) energy equation; b) momentum equation; c) continuity equation; d) flux conservation

Group B (Answer any four questions)		
1 a)	Briefly discuss the advantages of and disadvantages of numerical methods over other methods of solving a fluid flow problem.	6
b)	Explain how one dimensional continuity equation can be discretized by Finite Difference Method (Forward, Backward and central)	9
2 (a)	What is preprocessor, solver and post processor for a CFD package?	6
(b)	What do you mean by consistency and stability of a numerical scheme? Why it is essential to analyze the stability of a particular numerical scheme?	9
3	Explain how classification of linear 2 nd order differential equation is carried out into hyperbolic parabolic and elliptic types? Give example in each case. What do you mean by 'boundary value problem' and 'initial value problem'? Give example.	15
4	Discuss how equations $a_i T_i = b_i T_{i+1} + c_i T_{i-1} + d_i$ ($N \geq i \geq 1$) can be solved by TDMA, when T_1 and T_N are known. (a, b, c and d are constants).	15
5	How a set of algebraic equations can be solved by direct method and Gauss-Siedel method? Discuss why these methods are discouraged to solve a fluid flow problem. In this context describe the Scarborough criterion	15
6	Discuss various steps in solving a 1-D unsteady purely conduction heat transfer problem (in Cartesian coordinate system) with a constant heat generation using finite volume method.	15