CBCS SCHEME

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18AE72

Seventh Semester B.E. Degree Examination, July/August 2022
Computational Fluid Dynamics

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. What are CFD ideas to understand? **(15 Marks)**
b. Describe physical boundary condition. **(05 Marks)**

OR

2 a. Derive momentum equation for finite control volume fixed in space. **(15 Marks)**
b. What is form of governing equations particularly suited for CFD works? **(05 Marks)**

Module-2

3 a. Explain mathematical behavior of PDEs. **(06 Marks)**
b. Explain Cramer Rule technique for determining of classification of PDEs. **(14 Marks)**

OR

4 Explain the impact of classification on physical and computational fluid dynamics with case studies. **(20 Marks)**

Module-3

5 a. Explain features of structured and unstructured grids. **(08 Marks)**
b. Describe Delaunay – Voronoi method for unstructured grid generation. **(12 Marks)**

OR

6 a. What are the structured grid adaptive methods? **(10 Marks)**
b. What are unstructured grid adaptive methods? **(10 Marks)**

Module-4

7 a. Describe the explicit and implicit approach for solution of PDEs through finite difference discretisation. **(10 Marks)**
b. Explain time marching and space marching techniques in finite difference solutions. **(10 Marks)**

OR

8 a. Explain matrices technique for transforming grids from physical plane to computational plane. **(10 Marks)**
b. Explain Jacobian technique for transforming of grids form physical plane to computational plane **(10 Marks)**

Module-5

9 a. Describe the essence of finite volume discretisation. **(10 Marks)**
b. Explain flux vector splitting. **(10 Marks)**

OR

10 a. Describe cell centered scheme in finite volume discretisation. **(10 Marks)**
b. Explain the finite volume solution to diffusion problem below :

$$\frac{d}{dx}\left(K\frac{dT}{dx}\right)=0.$$ **(10 Marks)**

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