SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

ROLL NO: | | | | | | | | | | | | | Total number of pages:[02]

Total number of questions:08

M.Tech. - ME 1st/2nd Semester

Computational Fluid Dynamics

Subject Code: MME-504

Paper ID:

Batch: 2004 onwards/2011onwards/2015 onwards

Time allowed: 3 Hrs **Max Marks: 100**

Important Instructions:

(i) Attempt any five questions

(ii) All questions carry equal marks

(iii) Assume if any additional data is required but with justification.

Q. 1: Compare analytical, experimental and computational methods approach in solving engineering problems. (20 marks)

Q. 2: What are different governing equations used for solving the fluid mechanics and heat transfer problems? Write these equations in Cartesian co-ordinates with different boundary conditions to solve the same. (20 marks)

Q. 3: (i) Explain the Gauss-Siedel iterative method for solution of Laplace equation. What do you understand by over relaxation and under relaxation? (10 marks)

(ii) Determine the order of truncation error for the following: (10 marks)

$$\frac{\partial T}{\partial y} = \frac{-3T_{i,j} + 4T_{i,j+1} - T_{i,j+2}}{2\delta y}$$

Q. 4: Discuss that how would you select the use of finite difference method, finite element method and finite volume method for various engineering problems and applications. (20 marks)

Q. 5: (i) Find the numerical solution of one dimensional heat conduction through a pin fin.

(10 marks)

(ii) Explain the stability of numerical methods with its significance. (10 Marks)

Q. 6: How the governing equations simplified for incompressible flow. Why computational methods for compressible N-S equation can not be used for incompressible equation. What are the key features of pressure correction method? (20 Marks)

Q. 7: Explain the stream function vorticity method for viscous incompressible flows calculations in a flow field. What are the advantages and limitations of stream function vorticity method? (20 Marks)

Q. 8: Write short note on the following:

(i) Spectral method

(ii) Explicit and implicit methods (20 Marks)
