Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **17AE3006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCED COMPUTATIONAL FLUID DYNAMICS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Formulate the integral form of the Continuity equation by using the Reynolds Transport theorem. | CO1 | 10 |
| b. | Classify the Partial Differential equations using the Eigenvalue method. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Derive the Euler’s equation along a streamline. | CO1 | 10 |
| b. | Discuss the characteristics of elliptic partial differential equations with a suitable example. | CO1 | 10 |
| 3. |  | Deduce the finite-difference representation of the following derivative:. | CO3 | 20 |
| (OR) | | | | |
| 4. |  | Explain the Crank-Nicholson scheme to solve an unsteady diffusion problem with the relevant equations. | CO3 | 20 |
| 5. |  | An aluminium rod of length 1m is maintained at 345oC at the left side and 10oC at the right side. Evaluate the temperature distribution in the rod using a finite-difference scheme. Solve the resulting system of equations using an iterative method. Use a maximum of four grid points. Assume one-dimensional heat diffusion in the rod. | CO4 | 20 |
| (OR) | | | | |
| 6. |  | Solve the following system of equations using Jacobi method. | CO4 | 20 |
| 7. |  | Discuss the problems associated with using a uniform rectangular grid with an example. Explain the steps that are required to be followed to alleviate the problems using grid transformation. | CO5 | 20 |
| (OR) | | | | |
| 8. |  | Transform the following equation defined in the physical plane to the corresponding equation in the computational plane. | CO5 | 20 |
|  | | **Compulsory:** |  |  |
| 9. |  | Derive the Reynolds Averaged Navier-Stokes equation for a turbulent flow. | CO6 | 20 |