**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**
**(MID SEMESTER EXAMINATION)**

**CLASS: BE** **SEMESTER: VII**
**BRANCH: CE/C&P** **SESSION : MO/2019**

**SUBJECT : CL7017 COMPUTATIONAL FLUID DYNAMICS**

**TIME: 1.5 HOURS** **FULL MARKS: 25**

**INSTRUCTIONS:**
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

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Q1 (a) Write simplified flow model for incompressible fluid flow. [2]
(b) Derive the continuity equation in Cartesian coordinates. [3]

Q2 (a) Define creeping flow. [2]
(b) Discuss the advantages and disadvantages of analytical and experimental approach. [3]

Q3 (a) Write short note on boundary conditions. [2]
(b) Why and when Gauss-Siedel iterative method is preferred over Gauss-Elimination? [3]

Q4 (a) What is the Scarborough criterion? [2]
(b) Briefly explain on the Classification of Navier-Stokes equations. [3]

Q5 (a) Write the one dimensional advectionless and source less governing equation and descritize this equation by implicit scheme. [2]
(b) Calculate the numerical value of $(d(7x^3) / dx)$ at $x = 1$, using central difference approximation of second order accuracy, taking $\Delta x = 0.5$ and 0.1. Which answer will be more accurate and why? [3]

Q6 (a) Develop an expression for first order derivative forward difference scheme with first order accuracy for uniform grid. What is its truncation error? [2]
(b) Write the advantages and disadvantages of explicit method. [3]

**:::: 24/09/2019M ::::::**