Subject : Mathematics

Teacher name : Archana Jain Semester 3rd

Name of the Paper : Paper 4

Class: MSc(Mathematics)

November 2020

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| Kinematics of fluid in motion:Velocity at a point of a fluid. Lagrangian and Eulerian methods. Stream lines, path lines and streak liens, vorticity and circulation, Vortex lines, Acceleration and Material derivative, Equation of continuity (vector or Cartesian form). Reynolds transport Theorem. General analysis of fluid motion. Properties of fluids- static and dynamic pressure. Boundary surfaces and boundary surface conditions. Inotational and rotational motions. Velocity potential. |

December 2020

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| Equation of Motion : Lagrange's and Euler's equations of Motion (vector or in Cartesian form). Bernculli's theorem. Applications of the Bernoulli Equation in one –dimensional flow problems. Kelvins circulation theorem, vorticity equation. Energy equation for incompressible flow. Kinetic energy of irrotational flow. Kelvins minimum energy theorem ,mean potential over a spherical surface. Kinetic energy of infinite liquid. Uniqueness theorems. |

January2021

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| Stress components in a real fluid. Relations between rectangular components of stress. Connection between stresses and gradients of velocity.Navier- Stoke’s equations of motion. Steady flows between two parallel plates, Plane Poiseuille and Couette flows. |

February 2021

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| Reduction of Navier-Stock equations in flows having axis of symmetry, steady flow in circular pipe: the Hagen-Poiseuille flow, steady flow between two coaxial cylinders, flow between two concentric rotating cylinders. Steady flows through tubes of uniform crosssection in the form (i) Ellipse, (ii) equilateral triangle, (iii) rectangle, under constant pressure gradient, uniqueness theorem. |