DEPARTMENT OF MATHEMATICS
"T3 EXAMINATION JAN-JUN.2018"

Semester:4th
Subject:Fluid Mechanics
Branch:Applid Science
Course Type:Core
Time: 3 Hours
Max.Marks: 100

Date of Exam: 18.05.2018
Subject Code:MAH628-T
Session:
Course Nature:Hard
Program:M.Sc(maths)
Signature: HOD/Associate HOD:

Note: Attempt any Two Question from each section.

Section A

Q 1. Give proof for condition of surface to be a form of boundary surface .Also discuss the cases . (marks 10)

Q 2. State and Prove Bernoulli's Equation for Unsteady irrotatinal motion . (marks 10)

Q 3. State and Prove Lagrange's Equation motion (marks 10)

Section B

Q 4.(a) Define Source ,Sink and Doublets. (marks 10)

(b) What arrangement of source and sink will give rise to the function $w = \log\left(z - \frac{a^2}{z}\right)$. Draw a rough sketch of the stream line in this case and prove that two of them subdivide into the circle r= a and axis of Y. (marks 10)

Q 5. State and Prove Blasius Theorem . (marks 20)

Q 6. Two sources, each of strength M are placed at the points (-a,0) and (a,0)and a sink of strength 2M is placed at the origin show the stream lines are curves $(x^2 + y^2)^2 = a^2 [x^2 - y^2 + \lambda x y]$, where λ is parameter .Show also that the fluid speed at any point is $2M a^2$/ r1 r2r3 where r1, r2 ,r3 are respectively the distance of points from source and sink. (marks 20)

Section C

Q 7.(a) Define Equation of conservation of mass. (marks 10)

(b) What is equation of conservation of Energy give the prove . (marks 10)

Q 8. State and Prove Navier Stokes equation. (marks 20)

Q 9. Prove that net rate of change of the total property of the control mass system is equal to the sum of the net rate of change of the total property of the coinciding control volume and net rate of total property efflux out of the control surface. (marks 20)