Registration no: | | | | | | | | | | |

Total Number of Pages: 02

M.Sc
15MAME301

3RD Semester Regular / Back Examination – 2017-18
FLUID DYNAMICS
BRANCH(S): M.Sc.(MH)
Time: 3 Hours
Max Marks: 70
Q.CODE:B566

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) Define viscosity of a fluid and give its dimension.
b) Define thermal diffusivity.
c) What are the Lift and drag coeffficients?
d) What is substantial derivative?
e) What is dissipation function?
f) What do you mean by incompressible fluid?
g) What is recovery temperature?
h) Define forced convection and free convection flow.
i) What do you mean by Critical Reynolds number?
j) Define laminar and turbulent flow.

Q2 **a)** Derive the equation of continuity with the help of Cartesian tensor notation. **(5)**
b) Find the Navier-Stokes equations for the motion of a viscous compressible fluid. **(5)**

Q3 Establish a linear relationship between the components of stress and rate of strain for an isotropic fluid medium. Explain Stokes hypothesis. **(10)**

Q4 Discuss the velocity distribution in the flow of a viscous incompressible fluid between two parallel plates taking the fluid properties as constant in the following two cases **(10)**

(i) Plane poiseuille flow
(ii) Generalized plane couette flow.

Q5 **a)** Derive the Prandtl boundary layer equations for two dimensional flow of a slightly viscous incompressible fluid moving along a plane wall. **(5)**
b) Discuss the Blasius-Topfer solution for the boundary layer on a flat plate. **(5)**

Q6 **a)** Find two dimensional thermal boundary layer equation for flow over a plane wall. **(5)**
b) Derive the Karman momentum integral equation for a two-dimensional boundary layer flow of a liquid over a plane surface.. **(5)**

Q7 Find the velocity distribution in the steady flow of a viscous incompressible fluid along an infinitely long circular pipe due to an applied pressure gradient. Calculate **(10)**

the volume rate of flow through any cross section of the pipe.

Q8 Write short notes on any TWO (5 x 2)

a) Froude number
b) Prandtl number
c) Nusselt numer
d) Hiemenz flow