PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION JUNE 2018
(Fourth Semester)

Branch **MATHEMATICS**

FLUID DYNAMICS

1 ime: Three Flours Maximum: 75 Marks

Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 15 = 75)

1 a Give an account of (i) Density, weight and Specific Volume
(ii) Specific heat fluid properties. (15)
OR
b Derive the fluid motion by Lagrangian method. (8)

c Describe the vorticity in orthogonal curvilinear coordinates. (7)

2 a Verify the following invariants for two dimensional stress components

$(G_x\text{-}_x\text{- -}a_y.y')^2 + 4a\hat{}y = (a_{xx} + a_{v\,v})^2 + 4a_{xy}$ (5)

b Derive the relationship between stress and Strain. (10)
OR
c Derive the energy equation at conservation of energy. (15)

3 a State and prove Kelvin's theorem at constancy of circulation. (8)

b Give an examples of irrotational and rotational flows. (7)
OR
c Derive the integration of equation of motion in Bernoulli's equation. (7)

d Derive the Laplace equation of velocity potential in spherical coordinates. (8)

4 a Derive the velocity distribution of Couette flow of two parallel plates. Also solve the following.
(i) Average and maximum velocity distribution
(ii) Shearing Stress of Couette flow of tw o parallel plates (15)
OR
b State and prove Reynolds law of dynamical similarity. (7)

c Solve the shearing stress of flow[7] between two concentric rotating cylinders. (8)

5 a State the properties of Navier - Stokes equation. (7)

b Derive the momentum integral equation of the boundary layer by momentum law. . (8)
OR
c Solve the Prandtl boundary layer equation along a flat plate in account of the Blasius solution. (15)

Z-Z-Z END