QP Code: RD22MSC163 | Reg. No | | | | | | | | | | | AY 22

GIET UNIVERSITY, GUNUPUR – 765022

M. Sc. (Third Semester) Regular Examinations, December – 2023

22MTPE309 – Fluid Dynamics

(Mathematics)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A **(2 x 10 = 20 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. A velocity field in a plane flow is given by V= 2yt + x j . Find the equation of the stream line passing through (4,2) at t=2.	CO2	K2
b. Define Steady and Unsteady Flow.	CO1	K1
c. Velocity of a fluid particle in 2d steady incompressible flow is given by v= 4x I – 4y j . Find the equation of the streamline which is passes through (3,2).	CO1	K1
d. Define Hydrostatic law.	CO1	K1
e. Write the property of stoke's stream function.	CO3	K1
f. What is complex speed.	CO4	K1
g. Define Stream Function.	CO3	K1
h. Define Stress and writes its Units.	CO3	K1
i. What is stress Matrix , direct stress and shearing stress.	CO4	K1
j. What is the relation between Cartesian component of stress.	CO4	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ANY FIVE*** questions	Marks	CO #	Blooms Level
2. a. Derived the equation of motion of pressure at a point in a moving fluid	5	CO2	K2
b. Derive the steady flow through tube of uniform circular cross section.	5	CO4	K2
3.a. Derive the steady flow between concentric rotation cylinders.	10	CO4	K3
4. a. State and prove the Kelvin Circulation Theorem.	5	C02	K2
b. If φ *and* Ψ are function of x and y satisfying Laplace equation show that s + is analytics where $s = \frac{\partial \phi}{\partial y} - \frac{\partial \Psi}{\partial x}$ and $s = \frac{\partial \phi}{\partial y} + \frac{\partial \Psi}{\partial x}$	5	C02	K2
5.a. State and prove balscius's Theorem.	10	C03	K3
6. a. The velocity potential function for a 2D flows φ = x(2y-1) at a point(4,5). Determine the velocity and value of stream function.	5	C01	K2
b. Determine the velocity and acceleration at a point (2,1,3) at t = 0.5 sec . if u = yz + t , v = x z – t and w = x y.	5	C01	K2

7.a.	State and prove Kelvin's Energy Theorem.	5	C0 2	K2
b.	What is Euler' equations of motions. Derive the equation.	5	C0 2	K2
8. a.	Derive the steady motion between parallel planes.	5	C0 4	K2
b.	In a two dimensional fluid flow the stream function $\Psi = -\frac{y}{x^2+y^2}$. Find the velocity potential and complex potential.	5	C0 3	K2