ROLL NO:	

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20 % Max Marks: 40 Max Time: 1 hr. Monday, 24th September, 2018

TEST – 1

Odd Semester 2018-19 Course: **MEC 203 Fluid Mechanics & Machines** III Sem. Mechanical

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Instruction:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A

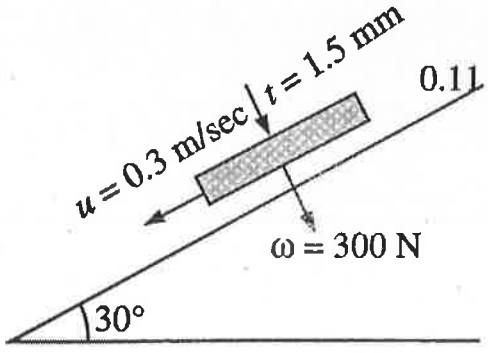
(3 Q x 4 M = 12 Marks)

1. Explain the terms: (i) Dynamic Viscosity (ii) Kinematic Viscosity. Give their dimensions.
2. Define the following.
   a) Mass density.
   b) Surface Tension
   c) Capillarity
   d) Compressibility.
3. Calculate the specific weight, density and specific gravity of a one litre of a liquid weighing 7N.

Part B

(2 Q x 8 M = 16 Marks)

4. Calculate the dynamic viscosity of an oil which is used for the lubrication between a square plate of size 0.8 m x 0.8 m and an inclined plane with angle of inclination 30^0 as shown in figure. The weight of the square plate is 300 N and it slides down the inclined plane with uniform velocity of 0.3 m/sec. The Thickness of oil film is 1.5mm.



5. If the velocity distribution over a plate is given by $u = \frac{2}{3}y - y^2$ in which u is the velocity in m/s at a distance y meter above the plate determine the shear stress at y = 0 and y = 0.15m take the dynamic viscosity of fluid as 8.63 Poise.

Part C

(1Q x 12 M = 12 Marks)

6.

a) State Hydrostatic Law. Derive an Expression for the pressure variation in a fluid at rest. (8 M)

b) Define Pressure. With line diagram explain types of pressure. (4 M)

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TEST 2

Odd Semester: 2018-19
Course Code: MEC 203
Course Name: Fluid Mechanics & Machines
Branch & Sem: MEC & III Sem

Date: 27 November 2018
Time: 1 Hour
Max Marks: 40
Weightage: 20%

Instructions:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **both** the Questions. **Each** question carries **five** marks. (2x5=10)

1. Define fluid kinematics & explain the methods of describing fluid flow

2. The Velocity potential function is given by $\phi = 5 (x^2 - y^2)$.Calculate the velocity components at the point (4, 5).

Part B

Answer **both** the Questions. Each question carries **six** marks. (3x6=18)

3. A stream function is given by $\Psi = 5x - 6y$. Calculate the velocity components and also magnitude and direction of the resultant velocity at any point.

4. Distinguish between:

   a) Steady & Unsteady flow
   b) Uniform & non uniform flow
   c) Compressible & incompressible flow

5. A Pipe of diameter 400 mm carries water at a velocity of 25 m/s. The pressures at the points A & B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B.

Part C

Answer the Question. Question carries **twelve** marks. (1x12=12)

6. What is a venturimeter & mention its Parts. Derive an expression for the discharge through a venturimeter

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END TERM FINAL EXAMINATION

Odd Semester: 2018-19 | **Date**: 28 December 2018

Course Code: MEC 203 | **Time**: 2 Hours

Course Name: Fluid Mechanics & Machines | **Max Marks**: 80

Programme & Sem: MECH & III Sem | **Weightage**: 40%

Instructions:

(i) Read the question properly and answer accordingly.

(ii) Question paper consists of 3 parts.

(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **both** the Questions. **Each** question carries **seven** marks. (2Qx7M=14)

1. State & explain Buckingham's Π theorem. How are the repeating variables selected in dimensional analysis?
2. Prove using Buckingham's Π theorem that the frictional torque T of a disc of diameter D rotating at a speed N in a fluid of viscosity μ and density ρ in a turbulent flow is given by $T=D^5N^2\rho\ \phi(\mu/D^2N\rho)$

Part B

Answer **all** the Questions. **Each** question carries **twelve** marks. (3Qx12M=36)

3. Experiments were conducted in a wind tunnel with a wind speed of 50km/hour on a flat plate of size 2m long and 1m wide. The density of air is 1.15 kg/m^3. The co-efficient of lift and drag are 0.75 and 0.15 respectively. Determine (i) the Lift force (ii) the drag force (iii) the resultant force (iv) Direction of resultant force (v) Power exerted by air on the plate.
4. An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm and throat 10cm. The oil mercury differential manometer shows a reading of 25cm. Calculate the discharge of oil through the horizontal venturimeter. Take Cd= 0.98.
5. What do you mean dimensionless numbers? Name & explain any 3 dimensionless numbers.

Part C

Answer **both** the Questions. **Each** question carries **fifteen** marks. (2Qx15M=30)

6. In a vertical pipe conveying oil of specific gravity 0.8, two pressure gauges have been installed at A and B where the diameters are 16cm and 8cm respectively. A is 2 meters above B. The pressure gauge readings have shown that the pressure at B is greater than at A by 0.981N/cm^2. Neglecting all losses, calculate the flow rate. If the gauges at A and B are replaced by tubes filled with the same fluid and connected to a U tube containing Mercury, Calculate the difference of level of Mercury in the two limbs of the U tube.
7. Define an orifice meter. Derive the expression for the discharge through an orifice meter.