**REG.NO:**

**SEMBODAI RUKMANI VARATHARAJAN ENGINEERING COLLEGE**

**ACADEMIC YEAR 2013-2014/ODD SEMESTER**

**MODEL EXAM**

**DEPARTMENT OF MECHANICAL ENGINEERING**

SET-B

**SUBJECT CODE/TITLE:** ME 2204 FLUID MECHANICS AND MACHINERY

**YEAR/SEM:** II/III **DATE:**

**DURATION:** 180 Mins **MAX.MARKS:** 100

**PART-A**

( 05X2 = 10 marks)

1.Define Compressibility.

2.Define Newtonian law of Viscosity

3.Define Orficemeter.

4.Define Pittot-tube.

5.hat is boundary layer?

6.Define drag and lift?

7.What is reaction turbine? Give example.

8.What is axial flow turbine?

9.Define Manometric efficiency

10.Define Mechanical efficiency

**PART-B**

(05\*16 = 80 marks)

1.a) Two plates are placed at a distance of 0.15mm apart. The lower plate is fixed while the upper plate having surface area 1.0 m2 is pulled at 0.3 Nm/s. Find the force and power required to maintain this speed, if the fluid separating them is having viscosity 1.5 poise. (8)

b) An oil film of thickness 1.5 mm is used for lubrication between a square plate of size 0.9m \*0.9m and an inclined plane having an angle of inclination 200 .The weight of square plate is 392.4 N and its slides down the plane with a uniform velocity of 0.2 m/s. find the dynamic viscosity of the oil. (8)

**or**

2. a) Assuming the bulk modulus of elasticity of water is 2.07 x10 6 kN/m2 at standard atmospheric condition determine the increase of pressure necessary to produce one percent reduction in volume at the same temperature. (8)

b)Calculate the capillary rise in glass tube pf 3mm diameter when immersed in mercury, take the surface tension and angle of contact of mercury as 0.52 N/m and 1300 respectively. Also determine the minimum size of the glass tube, if it is immersed in water, given that the surface tension of water is 0.0725 N/m and Capillary rise in tube is not exceed 0.5mm. (8)

3.Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom end is 24.525 N/cm2 and the pressure at the upper end is9.81 N/Cm2 . Determine the difference in datum head if the rate of flow through pipe is 40 lit/s. (16)

**or**

4. A pipe line carrying oil of specific gravity 0.87, changes in diameter from 200 mm diameter at a position A to 500 mm diameter at a position B which is 4 meters at a higher level. If the pressure at A and B which is 4 m at a higher level. If the pressures at A and B are 9.81 N/Cm 2 and 5.8 86 N/Cm2 respectively and the discharge is 20 litres/s determine the loss of head and direction of flow. (16)

5.Obtain an expression for Hagen- Poisulle flow. Deduce the condition of maximum velocity. (16)

**or**

6. A flat plate 1.5 m X 1.5 m moves at 50 km / h in a stationary air density 1.15 kg/ m³. If the coefficient of drag and lift are 0.15 and 0.75 respectively, determine (i) the lift force (ii) the drag force (iii) the resultant force and (iv) the power required to set the plate in motion .(16)

7. a) A pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 rpm. The net head on the pelton wheel is 700 m. If the side clearance angle is 15º and discharge through nozzle is 0.1 m³/s, find (1) power available at nozzle and (2) hydraulic efficiency of the turbine.

Take Cv=1 (8)

b) A turbine is to operate under a head of 25 m at 200rpm. The discharge is 9 m³/s. If the efficiency is 90% determine, Specific speed of the machine, Power generated and type of turbine. (8)

**or**

8. A pelton turbine is required to develop 9000 KW when working under a head of 300 m the impeller may rotate at 500 rpm. Assuming a jet ratio of 10 And an overall efficiency of 85% calculate (1) Quantity of water required. (2) Diameter of the wheel (3) Number of jets (4) Number and size of the bucket vanes on the runner. (16)

9. A Centrifugal pump having outer diameter equal to 2 times the inner diameter and running at 1200 rpm works against a total head of 75 m. The Velocity of flow through the impeller is constant and equal to 3 m/s. The vanes are set back at an angle of 30º at out let. If the outer diameter of impeller is 600 mm and width at outlet is 50 mm. Determine (i) Vane angle at inlet (ii) Workdone per second on impeller (iii) Manometric efficiency. (16)

**or**

10. The diameter and stroke of a single acting reciprocating pump are 200 mm and 400 mm respectively, the pump runs at 60 rpm and lifts 12 liters of water per second through a height of 25 m. The delivery pipe is 20m long and 150mm in diameter. Find (i) Theoretical power required to run the pump. (ii) Percentage of slip.(iii) Acceleration head at the beginning and middle of the delivery stroke. (16)