**REG.NO:**

**SEMBODAI RUKMANI VARATHARAJAN ENGINEERING COLLEGE**

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

**MODEL EXAM**

**DEPARTMENT OF MECHANICAL ENGINEERING**

SET-A

**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 Surface tension and Capillarity.

2.Define Viscosity.

3.What are the types of fluid flow?

4.Define stream line, streak line, path line flow.

5.Define displacement thickness

6.Define momentum thickness.

7.Define volumetric efficiency.

8.Define over all efficiency

9.What is meant by Priming?

10.Define Manometric head.

**PART-B**

(05\*16 = 80 marks)

1. a) What are the different types fluids? Explain each type.

b) Discuss the thermodynamic properties of fluids (8)

**(or)**

2. a) One litre of crude oil weighs 9.6 N. Calculate its Specific weight, density and specific weight. (8)

b) The Velocity Distribution for flow over a flat plate is given by u=(2/3)y-y2, Where u is the point velocity in meters per second at a distance y metre above the plate. Determine the shear stress at y=0 and y=15 cm. Assume dynamic viscosity as 8.63 poises (8)

3. a) Explain types of fluid flow.(8)

b)Explain all dimensional number.(8)

**(or)**

4. Derive continuity equation in three dimension (16)

5. a) Derive an expression for the velocity distribution for viscous flow

through a circular pipe. (8)

b) A main pipe divides into two parallel pipes, which again forms one pipe. The length and diameter for the first parallel pipe are 2000m and 1m respectively, while the length and diameter of second parallel pipe are 2000 and 0.8 m respectively. Find the rate of flow in each parallel pipe, if total flow in the main is 3 m³/s. Thecoefficient of friction for each parallel pipe is same and equal to 0.005.(8)

**(or)**

6. a) Two pipes of 15 cm and 30 cm diameters are laid in parallel to pass a total discharge of 100 liters/ second. Each pipe is 250 m long. Determine discharge through each pipe. Now these pipes are connected in series to connect two tanks 500 m apart, to carry same total discharge. Determine water level difference between the tanks. Neglect minor losses in both

cases, f=0.02 fn both pipes. (8)

b) A pipe line carrying oil of specific gravity 0.85, changes in diameter from 350 mm at position 1 to 550 mm diameter to a position 2, which is at 6 m at a higher level. If the pressure at position 1 and 2 are taken as 20 N/cm2 and 15 N/ cm2 respectively and discharge through the pipe is 0.2m³/s. determine the loss of head. (8)

7.An Outward flow reaction turbine has internal and external diameters of the runner as 0.5 m and 1.0 m respectively. The turbine is running at 250 rpm and rate of flow of water through the turbine is 8 m³/s. The width of the runner is constant at inlet and out let and is equal to 30 cm.

The head on the turbine is 10 m and discharge at outlet6 is radial, determine (1) Vane angle at inlet and outlet. (2) Velocity of flow at inlet and outlet. 16)

**(or)**

8. The Nozzle of a pelton Wheel gives a jet of 9 cm diameter and velocity75 m/s. Coefficient of velocity is 0.978. The pitch circle diameter is 1.5m and the deflection angle of the bucket is 170º. The wheel velocity is 0.46 times the jet velocity. Estimate the speed of the pelton wheel

turbine in rpm, theoretical power developed and also the efficiency of the turbine. (16)

9. Find the power required to drive a centrifugal pump which to drive a centrifugal pump which delivers 0.04 m3 /s of water to a height of 20 m through a 15 cm diameter pipe and 100 m long. The over all efficiency of the pump is 70% and coefficient of friction is 0.15 in the formula hf=4flv2/2gd. (16)

**(or)**

10. 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)