

**Government College of Engineering, Aurangabad**  
(An Autonomous Institute of Government of Maharashtra)  
**T.E. (Mech.) Examination**  
End Semester Examination Nov. 2016

**ME 345: FLUID MECHANICS & HYDRAULIC MACHINES**

Time: Three Hours

**12 4: NOV 2016**

Max. Marks: 60

*"Verify the course code and check whether you have got the correct question paper"*

**Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Assume suitable data if necessary.
4. Use of non-programmable calculator is allowed.

**Q.1: Attempt any two.**

**(16)**

- (i) Explain the method of determination of total pressure and center of pressure for curved surface submerged in the fluid.
- (ii) When a boat sails from sea water to fresh water, it sinks 5 cm. But when a man of 650 N weight jumps out of boat it again rises 5 cm. Find the weight of the boat. Take specific gravity of sea water as 1.05
- (iii) Explain the following for fluid kinematics:
  - (a) Stream function
  - (b) Velocity potential function
  - (c) Flow nets

**Q.2: Attempt any two.**

**(16)**

- (i) A ship is driven with a speed of 18 km/hr when resistance offered is 35 kN with the help of water jet whose velocity is 7.5 m/s relative to ship. The pump efficiency operating the jet is 80%. The frictional resistance of pipe is 2 m of water. Determine the power required to drive the pump and overall efficiency of the system when:
  - (a) water is taken from sides of the ship
  - (b) water enters ship through inlet facing the ship
- (ii) Explain the following types of losses for flow through pipes:
  - (a) Major head losses
  - (b) Minor head losses
- (iii) A resistance force  $F$  of a ship is a function of length  $L$ , velocity  $v$ , gravitational acceleration  $g$  and fluid properties  $\rho$  and  $\mu$ . Find out a non-dimensional relationship for the above problem.

**(P.T.O.)**

**Q.3: Attempt any two.**

**(16)**

- (i) A Francis turbine of diameter 3 m develops 7000 kW at 3000 rpm when head available is 50 m. A model of scale 1:8 is to be tested in laboratory where head available is 10 m. Find size, speed, discharge and power developed by model. Assume overall efficiency for both as 80%. Also find specific speed for both.
- (ii) Explain the governing of Pelton turbine with neat sketch.
- (iii) Explain following for centrifugal pumps:
  - (a) Various heads
  - (b) Various efficiencies

**Q.4: Write short notes on any two.**

**(12)**

- (i) Priming of centrifugal pumps
- (ii) Selection of turbines
- (iii) Power transmission through pipes
- (iv) Types of fluid flows

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