(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289802 Roll No.

B.TECH. (Agricultural Engineering)

Regular Theory Examination (Odd Sem-III), 2016-17

FLUID MECHANICS

Time : 3 Hours *Max. Marks : 100*

Note: The question paper is divided into three sections. Attempt each Section.

SECTION - A

1. Attempt the following short answer type questions: (10×2=20)

a) Define density and weight density?

b) What are the physical properties of fluids?

c) Why ships floats on water but a piece of iron sinks in water?

d) Define metacentre and matacentric height?

e) What is water hammer?

f) For what purposes siphons are used?

g) Define vortex motion and where does it occurs?

h) What do you understand by turbulent and laminar flow?

i) List the types of similarities and dimensionless numbers?

j) What do you mean by "Pascal's Law"?

SECTION - B

2. Attempt any five parts of the following: (5×10=50)

a) State Buckingham's theorem. What do you mean by repeating variables. How repeating variables selected for dimensional analysis?

b) Define viscosity. Distinguish between dynamic viscosity and kinematic viscosity and what are their uses?

c) Derive Darcy-Weisbach equation.

d) Discuss the minor and major losses during flow of fluid through pipes and fittings?

e) What is a venturimeter. Derive an expression for the discharge through a venturimeter?

f) Derive Hagen-Poiseuille equation and state the assumptions made?

SECTION - C

Note : Attempt two Questions: **(2×15=30)**

3. i) How is the continuity equation based on the principle of conservation of mass stated

ii) Show the streamlines and equipotential lines form a net of mutually perpendicular lines?

4. Define buoyancy and centre of buoyancy? A rectangular pontoon of 5mm long 3m wide and 1.2m deep is immersed 0.8m in sea water. If the density of sea water is 10KN/m^2, find the metacentric height of the pontoon?

Find the power required to rotate a circular disc of diameter 200 mm at 1000 rpm. The circular disc has a clearance of 0.4mm from the bottom fat plate and a clearance contains oil of viscosity 1.05 poise?

5. What is a free jet of fluid? Derive an expression for the path travelled by free jet issuing from a nozzle?

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