

Printed Pages : 3



EAG-301

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

PAPER ID : 180312

Roll No.

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B. Tech.(SEM. III) (ODD SEM.) THEORY
EXAMINATION, 2014-15**FLUID MECHANICS**

Time : 3 Hours]

[Total Marks : 100

Note : The question paper is divided into three sections.
Attempt each section.**SECTION-A****1** Attempt the following short answer type **10×2=20**
questions :

- (a) Define 'Fluid and Fluid mechanics'.
- (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 metacentric 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 understand by streak lines and streamlines?.

SECTION-B

2 Attempt any **three** parts of the following : **10×3=30**

- (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) State Bernoulli's theorem for steady flow of an incompressible fluid. Derrive an expression for Bernoulli's theorem from first principle and state assumptions made for such a derivation.

SECTION-C

3 Attempt any five question : **10×5=50**

- (a) What is a free jet of fluid? Derive an expression for the path travelled by free jet issuing from a nozzle.
- (b) Derive Hagen-Poiseuille equation and state the assumptions made.
- (c) (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.
- (c) What is equivalent pipe and derive “Dupit,s equation”. A 150 mm diameter horizontal pipe conveys water. If the slope of the hydraulic gradient is 1 in 130, find the rate of flow. Take $f = 0.005$?
- (f) Define buoyancy and centre of buoyancy. A rectangular pontoon of 5m long, 3m wide and 1.2 m deep is immersed 0.8m in sea water. If the density of sea water is 10 KN/m^2 , find the metacentric height of the pontoon.
- (g) For an inclined plane surface submerged in water obtain an expression for centre of pressure.