

Code: 9A01308

R09

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013

FLUID MECHANICS & HYDRAULIC MACHINERY

(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) Define surface tension. Derive the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure.
(b) One liter of crude oil weighs 9.6 N. Calculate its specific weight, density and specific gravity.
- 2 (a) What is stream tube? What are its characteristics?
(b) A pipe AB branches into two pipes from B, one pipe C has a diameter of 150 mm and the other pipe D has a diameter of 200 mm. The diameter at A is 450 mm and at B is 300 mm. The velocity of water at A is 2 m/s. If the velocity in pipe D be 4 m/s, determine the discharge through pipe AB, the velocity at B and velocity at C.
- 3 (a) Explain the principle of venturimeter with a neat sketch. Derive the expression for the rate of flow of fluid through it.
(b) An oil of specific gravity 0.9 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 20 cm. Calculate the discharge of oil through the horizontal Venturimeter. Take $C_d = 0.98$.
- 4 (a) Derive the equation for the force of impact of a fluid jet on a series of normal flat vanes mounted on a wheel. The vane velocity is less than jet velocity.
(b) A water jet of 7.5 cm diameter with a velocity of 40 m/s strikes a flat plate inclined at 45° to the horizontal. Determine the normal force on the plate:
(i) When the plate is stationary and
(ii) When the plate moves with a velocity of 20 m/s in the direction of jet and away from it. Also find the power and efficiency of jet when the plate is moving.
- 5 (a) Describe pumped storage plant with a neat sketch.
(b) Write short notes on:
(i) Scroll casing. (ii) Draft-tube and (iii) Tailrace.
- 6 (a) Differentiate between reaction turbines and hydraulic turbines.
(b) Draw a neat diagram of pelton turbine and explain its working.
- 7 (a) What are the conditions for the kinematic similarity to exist between model and prototype?
(b) How do you compare the performance of a turbine under different working conditions?
- 8 (a) Discuss in general the important operating characteristics of an axial flow pump.
(b) Define and derive an expression for the specific speed of a pump. How does specific speed help in pump selection?
