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THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2007

EE 04 304 – MECHANICAL ENGINEERING – II

(2004 admissions)

Time : Three Hours   Maximum : 100 Marks

*Answer **all** questions.*
Draw sketches wherever necessary.

1. (a) Define fluid, Newtonian fluid and ideal fluid.

   (b) Ships entering rivers from sea shows a rise (less submerged in water). Explain this phenomenon using the principle of floatation.

   (c) State and prove Pascals law.

   (d) What is a pitot tube ? Where it is used ?

   (e) Explain any *one* of nondimensional parameter in fluid mechanics, highlighting its significance.

   (f) Explain the selection of turbines on the basis of specific speed.

   (g) What is a deep well pump ? Where it is used ?

   (h) Compare V Belts with flat belts.

   $$(8 \times 5 = 40 \text{ marks})$$

2. (a) (i) A soap bubble of 40 mm diameter has a pressure difference of 25 N/m^2 between inside and outside surface. Find out the coefficient of surface tension of the interface.

      (ii) Explain the working of a Bourden tube pressure gauge with neat sketch.

      Or

   (b) (i) Determine the total force and centre of pressure for an annular metal ring of inner diameter 60 cm and outer diameter 240 cm immersed vertically in water such that uppermost point is submerged under a depth of one meter.

3. (a) (i) Derive the expression for discharge through a pipe (continuity equation) for one dimensional flow.

      (ii) Define coefficient of discharge, coefficient of velocity and coefficient of contraction for orifice.

      Or

   (b) (i) Distinguish between laminar flow, turbulent flow, compressible flow and incompressible flow.

      (ii) Water flows through a pipe of 100 mm diameter discharges at the rate of 90 litres per second. At a section, which is 6.5 m above the datum, pressure is 150 kN/m^2. Calculate the total energy of the flow.

Turn over

4. (a) (i) Velocity of fluid in a medium C depends on mass density P and viscosity μ and pressure P. Derive an expression for C using Rayleighs method.

(ii) Explain the selection criteria for Kaplan Turbine.

Or

(b) (i) Explain the advantages of using models and also explain different types of similitude.

(ii) A pelton wheel works under a head of 500 m develops 11000 kW at 300 rpm. Assuming an overall efficiency of 80 per cent and C_v for nozzle as 0.97, calculate : (1) Diameter of jet ; (2) Diameter of nozzle ; (3) Mean diameter of wheel ; (4) Number of buckets.

5. (a) (i) What is priming ? Why it is necessary ?

(ii) Mention the advantages of using air vessels.

(iii) Define specific speed of a pump.

(iv) Derive expression for belt slip.

Or

(b) (i) Derive expression for belt tensions ratio for open drive.

(ii) Mention the application of screw pump and gear pump.

(iii) Explain and sketch different pressure heads for a reciprocating using the indicator diagram.

[4 × 15 = 60 marks]