D 2328 (Pages : 2) Name...

Reg. No.....................................

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2009

EE 04 304—MECHANICAL ENGINEERING—II

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

1. (a) Define and explain Newton's law of viscosity.

   (b) What do you understand by 'Total Pressure' and 'Centre of Pressure' ?

   (c) Explain the principle of venturimeter with a sketch. Derive the expression for the rate of flow of fluid through it.

   (d) What are the advantages of triangular notch or weir over a rectangular notch ?

   (e) What are the methods of dimensional analysis ? Describe the Rayleigh's method for dimensional analysis.

   (f) What is a draft tube ? What are its functions ?

   (g) How will you obtain an expression for the minimum speed for starting a centrifugal pump ?

   (h) Define and explain the terms : Chain drive, slip and creep of a belt.

   ($8 \times 5 = 40$ marks)

2. (a) Calculate the pressure and density of air at a height of 3000 m above sea level where pressure and temperature of the air are 1.143 N/cm^2 and 15°C respectively. The temperature lapse-rate is given as 0.0065°K/m. Take density of air at sea level equal to 1.285 kg/m^3.

   Or

   (b) A circular plate of diameter 3 m is immersed in water in such a way that its least and greatest depth from the free surface of water are 1 m and 3 m respectively. For the front side of the plate, find (i) total force exerted by water and (ii) the position of center of pressure.

3. (a) Describe with the help of sketch the construction, operation an duse of Pitot-static tube.

   Or

   (b) A convergent-divergent mouthpiece having throat diameter of 60 mm is discharging water under a constant head of 3.0 m. Find maximum discharge and determine the maximum outlet diameter for maximum discharge. Take atmospheric pressure head = 10.3 m of water and separation pressure head = 2.5 m of water absolute.

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Turn over

4. (a) The efficiency η of geometrically similar fans depends upon the mass density of air ρ, its viscosity μ, speed of N (r.p.m.), diameter of blades D and discharge Q. Perform dimensional analysis.

Or

(b) Describe briefly the function of various main components of Pelton turbine with neat sketches.

5. (a) Derive an expression for the head lost due to friction in the delivery pipe of a reciprocating pump with and without an air vessel.

Or

(b) Derive an expression for the length of (i) an open belt and (ii) a crossed belt.

(4 × 15 = 60 marks)

[redacted]