b) Electrical transmission towers are stationed at 0.4km internals and a conducting cable 1.25cm in diameter is stretched between them. If a wind of 100km/hr blows transversly across the wire, compute the total drag force on such wire between two towers. The drag coefficient for Reynold's number greater than 10^4 may be taken as 1.20.

5. a) What are the classification of Turbine based on
   i) flow ii) specific speed
   iii) head available and iv) energy of striking fluid.

   b) Draw velocity triangles at
   i) Pelton wheel turbine and
   ii) Francis turbine

Or

a) Define : i) Specific speed of a turbine
   ii) Velocity triangle of centrifugal pump.

b) A francis turbine has to be designed to develop 367.5kn under a head of 70m, while running at a speed of 750 r.p.m. Ratio of width of runner to dia at runner is 0.1, Inner dia of runner is half of the outer dia of runner. Flow Ratio is 0.15, Hydraulic efficiency 95% and mechanical efficiency is 84%.

Four percent of the circumferential area of runner to be occupied by the thickness of vanes. Assume velaity of flow is constant and discharge is radial at outlet (or exit).

Calculate i) Dia of wheel and ii) The Quantity of water supplied.

Roll No .....

CE - 503

B.E. V Semester

Examination, December 2012

Fluid Mechanics - II

Time : Three Hours

Maximum Marks : 70/100

Note: *All questions are compulsory.*
Assume suitable data (if missing).

1. a) Define :
   i) Boundary Layer Concept
   ii) Aging of Pipes
   iii) Thickness at flow layers
   iv) Reynold's and Froude's number.

   b) A compound pipe system consists of 1800m of 50cm, 1200m at 40cm and 600m of 30cm pipes of the same material connected in series. What is the equivalent length of a 40cm pipe of the same material? Also calculate equivalent size at a pipe 3600m long?

Or

a) Derive an expression for a minor loss due to sudden contraction in the pipe flow analysis?

b) Determine the distribution of flow in the pipe network (fig. 1). The head loss $h_L = KQ^2$. The value of K for each pipe is indicated in figure 1. (Use Hardy cross method).

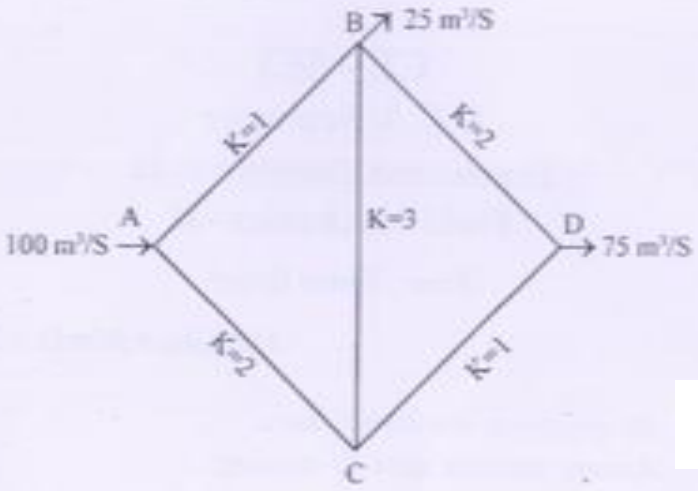

Fig 1.0

2. a) What are the basic differences between Pipe flow and open channel flow? Clearly mention with neat sketches (if necessary).

   b) Determine the dimensions of the most economical trapezoidal earth lined channel (meaning's n = 0.020) to carry 14 m^3/s at a slope of 4 in 10,000.

Or

   a) Define :

      i) Hydraulic Radius

      ii) Hydraulic Depth

      iii) Most economical channel conditions

      iv) Chezy's formula.

   b) A Rough timber fluse (n=0.012) in the form of an equilateral triangle (Apex down) of 1.2m sides is laid on slope of 0.01. Calculate the uniform flow rate which occurs at a depth of 90cm.

3. a) Define :

      i) Critical flow

      ii) Specific energy of fluid flow

      iii) Subsequent depth ratio

      iv) Rapid shooting flow

   b) For a hydraulic jump in a rectangular channel the velocity and the depth after the jump are known to be 0.80 M/s and 1.75m, respectively. Calculate the depth before the jump, the energy loss and the power dissipated per metre width.

Or

   a) Define :

      i) Siphon ii) Surge Tank

      iii) Hydraulic Jump iv) Gradually varied flow

   b) A rectangular channel has a width of 1.8m and carries a discharge at 1.8 m^3/s at a depth of 0.020m. Calculate i) The specific energy ii) depth alternate to the existing depth and iii) froude number at the alternate depths.

4. a) Define Total Drag and lift. Also define Magnus effect?

   b) A Kite weighing 2.45N and having an effective area of 0.8m^2, assumes an angle of 15° to the horizontal and the chord attached to it makes an angle of 45° to the horizontal. The pull on the chord during a wind of 34 km/hr is 25.5N. Determine the corresponding coefficients of lift and drag. The specific weight at air is 12.25 N/m^3.

Or

   a) Define :

      i) Pressure drag ii) Profile drag

      iii) Airfoil iv) Wake or eddies