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**CE-503 (GS)****B.E. V Semester**

Examination, December 2017

**Grading System (GS)****Fluid Mechanics-II****Time : Three Hours****Maximum Marks : 70**

- Note:** i) Attempt any five questions.  
 ii) All questions carry equal marks.  
 iii) Assume data suitably if any missing.

1. a) What do you understand by Boundary Layer theory? Illustrate with reference to flow over a flat plate. 6  
 b) The difference in the water surface levels of two reservoirs which are connected by a siphon is 8m. The length of the siphon is 600m and its diameter 0.3m. Assuming  $f = 0.02$ , determine the discharge when the siphon is running full. 8
2. a) Show that the maximum transmission of power through pipe restricted to 66.66%. 6  
 b) A 0.3m dia. Pipe 2340m long is connected with a reservoir whose surface is 72m above the discharging end of the pipe. If for the last 1170m, a second pipe of the same diameter be laid beside the first and connected to it, what would be the increase in the discharge? Take  $f = 0.02$ . 8
3. a) What is Specific Energy Curve? Explain with the help of a neat sketch? 6  
 b) Derive the Chezy's formula for calculating the discharge through a channel. State different empirical formula for finding out Chezy's constant. 8

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4. a) Define the term afflux and back water curve. 6  
 b) Obtain an expression for dynamic equation for gradually varied flow and state the assumption made in the analysis. 8
5. a) Define the term drag and lift force also explain the different types of drag force. 6  
 b) Calculate the friction drag on a plate 15cm wide and 45cm long placed longitudinally in a stream of oil (sp. Gravity 0.925 and kinematic viscosity of 0.9 stokes) flowing with a free stream velocity of 6m/s. Also find the thickness of the boundary layer and shear stress at the trailing edge. 8
6. a) State the principle on which turbomachines are based. Which type of turbine is best suited to condition of changing loads on the turbine, and why? 6  
 b) A 15m/s velocity jet of water 5cm in diameter strikes perpendicularly at flat smooth plate. Determine the force exerted by the jet on the plate, if (i) the plate is at rest (ii) it moves in the direction of jet with a velocity of 5m/s. Also determine the work done in each case and the efficiency of jet in the second case. 8
7. a) How would you compute the specific speed for a (i) double suction pump and (ii) multistage pump. 6  
 b) Explain the working of Reciprocating pump with neat sketch. 8
8. a) What do you mean by water hammer? Obtain an expression for rise in pressure in a thin plastic pipe in which the flow of water is suddenly stopped by closing the valve. 6  
 b) Determine the dimensions of the most economical trapezoidal earth lined channel (Manning's  $n = 0.020$ ) to carry  $14\text{m}^3/\text{s}$  at a slope of 4 in 10,000. 8

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