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(2125)

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**B. Tech 5th Semester Examination**  
**Fluid Mechanics and Fluid Machines (NS)**

AU-311

**Time : 3 Hours**

**Max. Marks : 100**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Attempt five questions in all selecting one question from each of the sections A, B, C and D of the question paper and all the subparts of the question in Section-E. Use of non programmable calculator is allowed.

**SECTION - A**

1. (a) Explain the importance of viscosity in fluid motion. Discuss the effect of temperature on viscosity of water and air. (10)
- (b) Differentiate between Eulerian and Lagrangian method of representing fluid motion. (10)
2. Explain the following types of equilibrium of floating bodies  
(i) stable equilibrium (ii) unstable equilibrium (20)

**SECTION - B**

3. The velocity potential for a two dimensional flow is  
 $\phi = x(2y-1)$   
Determine the velocity at the point P(4,5). Also obtain the value of stream function at this point P. (20)

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4. Derive Euler's equation of motion along a stream line and hence derive the Bernoulli's equation. (20)

**SECTION - C**

5. What is meant by boundary layer separation? Describe with sketches the methods to control separation. (20)
6. A 2500m long pipeline is used for transmission of power 120 kW power is to be transmitted through the pipe in which water having a pressure of 4000 kN/m<sup>2</sup> at inlet is flowing. If the pressure drop over the length of pipe is 800 kN/m<sup>2</sup> and  $f=0.006$ , find:  
(i) Diameter of the pipe and  
(ii) Efficiency of transmission. (20)

**SECTION - D**

7. A centrifugal pump is required to deliver 50 ltr of water per second to a height of 30m through a 100 m long pipe of 15cm diameter. The inlet losses in suction pipe are estimated to be 0.35m. Assuming an overall efficiency of 70% and taking Darcy's friction coefficient 0.015 for the pipe line, determine the power required to drive the pump. (20)
8. (a) Give a brief account of providing air vessels on the suction and delivery sides of a reciprocating pump. (10)
- (b) Enumerate the salient points of difference between centrifugal and reciprocating pump. (10)

## SECTION - E

9. (a) Differentiate between real and ideal fluid.
- (b) What is centre of buoyancy?
- (c) Explain streak and path lines.
- (d) What is the function of a venturimeter?
- (e) What do you understand by boundary layer?
- (f) What is meant by turbulent flow?
- (g) Define hydraulic efficiency of a centrifugal pump.
- (h) What is meant by cavitation?
- (i) Define volumetric efficiency.
- (j) Explain flow nets. (2×10=20)