Printed Pages: 02 **Sub Code: NCE 301/ ECE 301**

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B TECH
(SEM III) THEORY EXAMINATION 2017-18
FLUID MECHANICS

Time: 3Hours ***Max. Marks: 100***

Note: Attempt all Sections. Assume missing data, if any.

SECTION A

1. Attempt *all* questions in brief. 10x2 = 20

a. Two horizontal plates are placed 1.25cm apart, The space between them being filled with oil of viscosity 14 poise. Calculate the shear stress in oil if upper plate is moved with a velocity of 22.5m/s.
b. Define surface tension on a liquid jet.
c. What is Convective Acceleration?
d. Draw the figure of discharge over a rectangular Notch.
e. What is doublet of Strength?
f. Write important Characteristics of Stream Line.
g. Define Turbulent Boundary layer.
h. What do you understand Bluffy Body?
i. Write the Practical Application of Froude Number.
j. What do you understand for Diffusers?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. In fluid Mechanics, why the average properties are observed in lab? explain
b. A spillway 7.2 mtr high and 150mtr long discharge 2150m^3/s a head of 4mtr. If 1:16 model of spillway to be constructed. Find the model dimensions, head over the model and model discharge.
c. What do you understand Hydro-Dynamically smooth and Rough Boundaries?
d. Draw the pressure distribution, theoretical as well as experimental, on an airfoil in the fluid flow.
e. State and Prove of Pascal's law.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) The components of velocity of a flow field are given by u=yz+t. v=xz+t, w=xy Determine the velocity at A (1, 3, 5) after 2 seconds.
(b) What is the importance of Model Testing?

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Show that the discharge over a spillway can be expressed as
$Q=VD^2\phi[\sqrt{gh}/v, H/D]$,
where V=Velocity of Flow, D=Throat Depth , H =Head , g= acceleration due to gravity
(b) Derive expressions for any two dimensionless numbers.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) How momentum equation used in determining the force exerted by a flowing fluid in pipe bend?

(b) A 30 cm diameter horizontal pipe terminates in a nozzle with the exit diameter of 7.5cm.if the water flows through the pipe at a rate of $0.15m^3$/sec .What force will be exerted by the fluid on the nozzle?

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Derive the expression for the energy head loss in a pipe expansion.

(b) Explain the VON Karman Integral Momentum Equation.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) What do you mean by Separation of Boundary Layer?

(b) Determine the thickness of the boundary layer at the trailing edge of smooth plate of length 4mtr and width 1.5mtr.when the plate is moving with a velocity of 4m/s in stationary air. Take kinematic viscosity of air $1.5x10^{-5}$ m^2/s.