Roll No. Total No. of Pages : 02

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B.Tech. (Aerospace Engineering) (2012 Onwards) (Sem.–3)

FLUID MECHANICS & MACHINERY

Subject Code : ASPE-201

M.Code : 70903

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1) Attempt the following :

a. Define specific gravity

b. Define dynamic viscosity

c. Define Gauge pressure

d. Define Pathline

e. Define degree of reaction

f. Define coefficient of discharge.

g. State Buckingham pi theorem.

h. Define Fluid.

i. What is the SI unit for 'Head' as used in Hydraulic machines?

j. Define specific speed.

SECTION-B

2) Derive Bernoulli's equation. NOTE: Mention the assumptions clearly. [2M for assumptions, 3M for the derivation]

3) Explain the working of Mercuric manometer and explain how absolute pressure and gauge pressure of a system can be measured using this manometer.

4) Explain the working of Fransis turbine with help of a neat velocity diagram.

5) A velocity field is given by the relation $V = \left(\frac{V_o}{I}\right)(x\vec{i} - y\vec{j})$. Where V_o and I are constants.

   i. Find the location in the flow field where the speed is equal to Vo

   ii. Determine the streamlines.

6) With the help of a neat diagram, explain the working of a vane pump.

SECTION-C

7) A centrifugal water pump has an impeller of width h = 5 cm, an inner radius of 7 cm, and an outer radius of 30 cm. It turns at 1,800 rpm. The inlet velocity is 6 m/s and the exit velocity is 7 m/s. Find the theoretical values of :

   a) Discharge rate

   b) Torque

   c) Head

   d) Pressure rise across the impeller.

8) Apply Buckingham Pi theorem to a turbomachine and obtain its non-dimensional parameters.

9) Through control volume analysis, obtain Euler's equation for turbomachinery.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.