R13

Code No: 114DF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May-2015
MECHANICS OF FLUIDS AND HYDRAULIC MACHINES
(Common to ME, MIE, MS&NT)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

Part- A

(25 Marks)

1.a)	Differentiate U-tube manometer and differential manometer.	[2M]
b)	What is Capillarity? State the factors that affect the viscosity of a fluid.	[3M]
c)	What do you mean by rotational and irrotational flows?	[2M]
d)	What is momentum equation? What are its applications?	[3M]
e)	Distinguish between Orifice meter and venturi meter.	[2M]
f)	Distinguish between drag and lift.	[3M]
g)	What is the difference between turbine and pump?	[2M]
h)	What is cavitation? What is the significance of it?	[3M]
i)	Give the classification of pumps.	[2M]
j)	What is NPSH? Explain.	[3M]

Part-B

(50 Marks)

2.a) Distinguish between:
i) standard and local atmospheric pressures,
ii) barometric pressure and absolute pressure and
iii) absolute pressure and gauge pressure.

b) Explain the working of a Bourdon pressure gauge with a neat sketch. [5+5]

OR

3.a) Define Viscosity, Surface tension and Vapor Pressure and explain their influence on fluid motion.

b) An open tank contains water up to a depth of 1.5 m and above it an oil of sp.gr.0.8 for a depth of 2 m. Find the pressure intensity:
i) at the interface of the two liquids, and
ii) at the bottom of the tank. [5+5]

4.a) Derive continuity equation for 3-D flow.

b) The water is flowing through a pipe having diameters 20cm and 15 cm at sections 1 and 2 respectively. The rate of flow through pipe is 40 litres/s. The section 1 is 9 m above datum line and section 2 is 5 m above the datum. If the pressure at section 1 is 32.40 N/cm^2, find the intensity of pressure at section 2. [5+5]

OR

5.a) Derive Bermoullis equation from Eulers equation.
b) A 22cm diameter pipe carries water under a head of 10 metres with a velocity of 7m/s. If the axis of the pipe turns through 45°, find the magnitude and direction of the resultant force at the bend. [5+5]

6.a) What conditions should be satisfied for separation of boundary layer? Discuss briefly the methods that can be used to prevent separation.
b) How will you determine whether a boundary layer flow is attached flow or detached flow or on the verge of separation? [5+5]

OR

7.a) What do you understand by pipes in series, pipes in parallel and equivalent pipe.
b) Derive discharge equation for a venturimeter. [5+5]

8.a) Describe the theory of a draft tube with the help of a neat sketch.
b) Design a single jet Pelton wheel to develop a power of 500 KW under a head of 160 m while running at 300 rpm. Assume Ku = 0.45, Cv = 0.985 and overall efficiency = 80%. Calculate the jet diameter, wheel diameter and number of buckets. Give a fully dimensional sketch of a bucket. [5+5]

OR

9.a) What is specific speed. State its significance in the study of hydraulic machines.
b) By means of a neat sketch, explain the governing mechanism of Francis Turbine. [5+5]

10.a) Define a centrifugal pump. Explain the working of a single-stage and multistage centrifugal pumps with sketches.
b) The internal and external diameters of the impeller of a centrifugal pump are 225 mm and 450 mm respectively. The pump is running at 1100 r.p.m. The vane angles at inlet and outlet are 25^0 and 35^0 respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. [5+5]

OR

11.a) Explain the principle and working of a Reciprocating pump.
b) Explain:
i) Slip and
ii) Indicator Diagram. [5+5]

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