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Total No. of Pages : 02

Total No. of Questions : 09

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

FLUID MECHANICS & MACHINERY

Subject Code : ASPE-201

Paper ID : [A2195]

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**Q1 Attempt the following :**

- a) Define volumetric efficiency of a turbine.
- b) What do you mean by 'Net Positive Suction Head'?
- c) Define compressible flow.
- d) Define stream function and velocity potential function.
- e) Define kinematic viscosity. Explain its importance.
- f) Classify centrifugal pumps.
- g) What do you mean by cavitation in pumps?
- h) Define degree of reaction with respect to hydraulic turbine.
- i) Define slip and negative slip in reciprocating pump.
- j) Define absolute and gauge pressures.

SECTION-B

- Q2 Derive an expression for capillary rise of a liquid having surface tension (σ) and contact angle (θ) between two vertical parallel plates at a distance (W) apart. If the plates are made of glass, what will be the capillary rise of water? Assume $\sigma = 0.773 \text{ N/m}$, $\theta = 0^\circ$ and $W = 1 \text{ mm}$.
- Q3 What is flow similarity? In a geometrically similar model of spillway, the discharge per meter length is $0.2 \text{ m}^3/\text{s}$. If the scale of the model is $1/36$, find the discharge per meter length of the model.
- Q4 Explain various flow visualization techniques briefly.
- Q5 Describe the Moody's chart.
- Q6 Explain Performance characteristics of centrifugal pump with the help of diagrams.

SECTION-C

- Q7 Classify hydraulic turbines. Explain functions of hydraulic turbines. Explain the working principles of Pelton turbine and Kaplan turbine. (1,1,4,4)
- Q8 a) Write a note on Buckingham's π theorem and explain its applications. (4,2)
- b) Briefly explain displacement thickness and momentum thickness. (4)
- Q9 a) What do you mean by 'Indicator Diagram'? Prove that the work done by the pump is proportional to the area of the indicator diagram. (2,3)
- b) A 400 mm diameter shaft is rotating at 200 rpm in a bearing of length 120 mm. If the thickness of film is 1.5 mm and dynamic viscosity of the oil is 0.7 N.s/m^2 , determine :
- i) Torque required to overcome friction
- ii) Power utilized to overcome viscous friction, assuming linear velocity profile. (2,3)