Total No. of Questions – [03]

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PRN No.	

Paper Code	V222-263 (ESE)

MAY 2022 - ENDSEM EXAM

S.Y. B. TECH. (MECHANICAL) (SEMESTER - II)

COURSE NAME: FLUID MECHANICS AND MACHINES

COURSE CODE: MEUA22203

(PATTERN 2020)

Time: [1 Hr]

[Max. Marks: 30]

Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **'a' part of every question is compulsory**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1

a) Describe with neat sketches any four methods used for preventing the boundary layer separation. [4]

b) A 150 mm diameter pipe carries a liquid in a laminar regime. A Pitot tube placed in the flow at a radial distance of 15 mm from axis of the pipe indicates velocity of 0.5 m/s. Calculate the maximum velocity, the mean velocity and the discharge in the pipe. [6]

OR

b) Oil of relative density 0.92 and dynamic viscosity 1.05 poise flowing between two parallel fixed plates, 12 mm apart, has mean velocity of 1.4 m/s. Calculate the maximum velocity, boundary shear stress, velocity and shear stress at a distance of 2 mm from the lower fixed plate. [6]

Q2

a)) Why the draft tube is used in reaction turbines. List types of draft tubes used in reaction turbines. [4]

b) The following data refers to the runner of Kaplan turbine which develops 8850 kW at the turbine shaft: net head 5.5 m, speed ratio = 2.1, flow ratio = = 0.67, overall efficiency = 85 %, Reassuming the hub diameter of the wheel is 0.35 times the outer diameter, Estimate the outer diameter of the runner, rotational speed of the runner. [6]

OR

b) A double jet Pelton wheel operates under a head of 40 m and develops 735 kW brake power when running at 450 rpm. Make calculations for the flow rate and the jet diameter of the nozzle. Assume overall efficiency = 0.85 and Cv of the nozzle = 0.98 [6]

Q.3 a) What do you mean by specific speed of pump? Write mathematical formula and give significance of it. [4]

b) A centrifugal pump impeller inside and outside diameters are 25 cm and 50 cm respectively The pump is discharging 0.2 m^3/s when running at 800 rpm against a total head of 25 m. The flow area remains constant as 0.08 m^2 and the exit blade angle is 30 °. Determine inlet vane angle and monomeric efficiency of the pump. [6]

OR

b) An impeller of a centrifugal pump has inlet diameter 20 cm and outlet diameter 50 cm. The exit vane angle is 30°. The impeller is running at 1000 rpm and assuming constant velocity of flow as 2 m/s, then determine Inlet vane angle and power required to run the impeller if mechanical efficiency is 90 % and flow rate through the impeller is 100 m^3/hr. [6]