

TME-604

Roll No. to be filled in your Answer Book

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**B.Tech.****Mechanical Engineering,(VI Sem.)****Fluid Machinery(TME-604)**

PAPER ID-

Time- 3 Hours

Max marks: 100

**NOTE:**

- i. All questions are compulsory.
- ii. Draw diagrams wherever necessary.
- iii. All questions carry equal marks. .

1. Attempt any **FOUR** parts of the following.

5 X 4

- (A) Under what conditions would a reaction turbine work as a pump?
- (B) What are the different functions of a draft tube?
- (C) Why centrifugal pumps are less efficient as compared to turbines?
- (D) What is cavitation? How can it be avoided in reaction turbines?
- (E) Explain why priming is essential before starting a centrifugal pump?
- (F) Explain why suction lift of a pump cannot exceed a certain limit?

2. Write short note on any **four** parts

5 X 4

- (A) Airlift pumps
- (B) Hydraulic accumulators
- (C) Function of air vessels
- (D) Vane pumps
- (E) Degree of reaction in turbines
- (F) Torque convertor

3. Attempt any **TWO** parts of the following

10X2

- (A) Derive an expression for the force exerted by a jet on moving flat plate, which is inclined at an angle of  $\alpha$  from the jet axis. Explain the effect of inclination of the plate.

- (B) Define specific speed of a centrifugal pump & derive an expression for the same.
- (C) A Francis turbine has an inlet diameter of 2.0 m and an outlet diameter of 1.2 m. The breadth of the blades is constant at 0.2 m. the runner rotates at a speed of 250 rpm with a discharge  $8 \text{ m}^3/\text{sec}$ . The vanes are radial at the inlet and the discharge is radially outwards at the outlet. Calculate the angle of guide vane at the inlet and blade angle at the outlet.

4. Attempt any **TWO** parts of the following

10X2

- (A) Describe with neat and clean sketch working of:
- Hydraulic Press
  - Hydraulic Accumulator
- (B) What is governing? How it is achieved in Francis turbine?
- (C) With the help of a neat and clean diagram explain the working principle of reciprocating pump.

5. Attempt any **TWO** parts of the following

10 X 2

- (A) A Pelton wheel runs under a head of 400 m at a speed of 1000 RPM. It develops a power of 5000 kW. Find the least diameter of jet and the pitch circle diameter of the wheel. Assume overall efficiency of turbine as 85%;  $C_v = 0.99$  and speed ratio is 0.45. Also find the number of buckets. Assume any data, if required.
- (B) Derive Euler's momentum equation for hydrodynamic machines.
- (C) A flat plate is struck normally by a jet of water of diameter 50 mm. if the discharge is  $0.0353 \text{ m}^3/\text{s}$ , calculate the force on the plate when it is stationary.

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