Total No. of Questions: 22 Total No. of Pages: 02

Roll No. _____

B. Tech IV sem (Main/Back) Exam April-May 2026
Automobile Engg.
4AE4-05 Fluid Mechanics and Fluid Machines/Fluid Engineering
Paper Code : 4E1310
AE, ME,PI

Time: 3 Hours **Maximum Marks: 70**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No.205)
1._____ 2._____

Part A (Answer should be given up to 25 words only)
All questions are compulsory
T-416

Q1: *Define the following fluid properties: Mass density, specific weight, specific volume, specific gravity and compressibility.*

Q2: Explain the variation of viscosity with temperature.

Q3: Calculate the specific weight, mass density and specific gravity one litre of a liquid and which weight is 7 N.

Q4: Differentiate kinematic viscosity and dynamic viscosity. Give their dimensions.

Q5: Define dimensional homogeneity.

Q6: Define volumetric efficiency of a turbine.

Q7: List the important characteristic curves of a turbine.

Q8: Define the Euler equation of a pump.

Q9: Name all the velocity components at inlet and exit of the rotor of a turbine.

Q10: Write the four differences between Fancies and Kaplan turbine. 10 x 2 = 20

Part B (Analytical/Problem solving questions)
Attempt any Five questions
T-416

Q1: A plate 0.025mm at a distance from a fixed plate moves at 60 cm/sec and requires a force of 2 N/m². Determine the dynamic and kinematic viscosity between the plates.

Q2: Define surface tension. Derive the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure.

Q3: The surface tension of water in contact air at 20°C is 0.072 N/m. The pressure inside of water droplet of water is to be 0.02 N/cm2 greater than the outside pressure. Calculate the diameter of the droplet of water.

Free RTU papers at ersahilgyan.com

Paper Code
4E1310

Q4 Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid

Q5 The time period (t) of a pendulum depends upon the length (l) of the pendulum and acceleration due to gravity (g). Derive expression for time period.

Q6 Derive the expression for velocity triangles and work done for Pelton wheel

Q7 Describe briefly about pumps in series and pumps in parallel. Derive the expression for specific speed and what is the minimum starting speed.

5x 4 = 20

Part C (Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q1: Define the following terms: vapour pressure, manometers, center of pressure, buoyant force and energy gradient.

Q.2: A Pelton wheel is to be designed for the following specifications: Shaft power =11,772 KW; Head=380 m; Speed =750 rpm; Overall efficiency = 86%; Jet Diameter is not exceeding one - sixth of the wheel diameter. Determine: a) The wheel diameter b) The number of jets required c) Diameter of the jet; Take Kv 1 = 0.98 , Ku 1 = 0.45

Q.3: Francis turbine with an overall efficiency of 75% is required to produce 148.25 kW power. It is working under a head of 7.62m. The peripheral velocity = 0.26 $\sqrt{2}$ gh and the radial velocity of flow at inlet is 0.96 $\sqrt{2}$ gh The wheel runs at 150 rpm. and the hydraulic losses in the turbine are 22% of the available energy. Assuming radial discharge, determine: a) The guide blade angle b) The wheel vane angle at inlet c) Diameter of the wheel at inlet d) Width of the wheel at inlet.

Q.4: A centrifugal pump delivers water against a net head of 14.5m and a design speed of 1000 rpm. The vanes of curved back to an angle of 30° with the periphery. The impeller diameter is 300 mm and outlet width is 50mm. Determine the discharge of the pump if manometric efficiency is 95%.

Q5: Explain the working principle of centrifugal pump and obtain the expression for work done by an impeller.

3 x 10= 30

Free RTU papers at erishikagyan.com