

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER– IV EXAMINATION – SUMMER 2026****Subject Code:3141906****Date:21-05-2026****Subject Name: Fluid Mechanics and Hydraulics Machines****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Define the following terms (i) kinematic viscosity (ii) meniscus effect (iii) specific gravity	03
	(b) Explain effect of temperature on viscosity of the fluid	04
	(c) State and prove Bernoulli's equation. List the assumptions which are made while deriving Bernoulli's equation. What are the limitations of the Bernoulli's equation?	07
Q.2	(a) Discuss types of equilibrium of floating body.	03
	(b) Derive general equation of variation of pressure due to gravity.	04
	(c) Explain governing of Impulse turbines.	07
	OR	
	(c) Give differences between impulse and reaction turbine	07
Q.3	(a) Define absolute pressure, gauge pressure and vacuum pressure.	03
	(b) A block of wood of specific gravity 0.7 floats in water. Determine the metacentric height of the block if its size is 2mX1mX0.8m. Height of block is 0.8 m	04
	(c) Explain Reynold's experiment with proper diagrams. Distinguish between Laminar and Turbulent flow.	07
	OR	
Q.3	(a) What are repeating variables? How are these selected by dimensional analysis?	03
	(b) Explain the concept of hydraulic gradient and total energy lines.	04
	(c) A pelton wheel of 2.5 m diameter operates under the following conditions : Net available head = 300 m; speed = 300 rpm; Blade angle at outlet = 165°; C_v of the jet = 0.98 ; Blade friction coefficient = 0.95 ; jet diameter = 20 cm ; Mechanical efficiency = 95% . Determine (i) the power developed (ii) specific speed (iii) hydraulic efficiency	07
Q.4	(a) Define equipotential line, stream line and flow net.	03
	(b) Check whether the flow of liquid given by $u = 5x$ and $v = -5y$ is continuous or rotational	04
	(c) Derive the equation of maximum efficiency of series of moving curved vanes configuration.	07

OR

- Q.4** (a) Derive equation of flow over rectangular notch. **03**
(b) List out and explain various heads in a centrifugal pump **04**
(c) Oil of viscosity 0.05 N-s/m^2 is flowing between two stationary parallel plates 1 m wide and maintained 10 mm apart. The velocity midway between the plates is 3 m/s. Find (i) pressure gradient along the flow (ii) average velocity (iii) discharge of oil. **07**

- Q.5** (a) Explain the function of draft tube in the case of reaction turbines **03**
(b) What is similitude? Define Geometric, Kinematic and Dynamic similarity **04**
(c) Explain characteristics curves of centrifugal pump. **07**

OR

- Q.5** (a) What are major and minor energy losses? **03**
(b) State and derive Pascal's law. **04**
(c) With neat sketch explain construction and working of hydraulic accumulator **07**
