GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester - Regular) Examinations, May – 2024

22BMEPC24001 – Fluid mechanics and Hydraulic Machines

(Mechanical)

Time: 3 hrs Maximum: 70 Marks

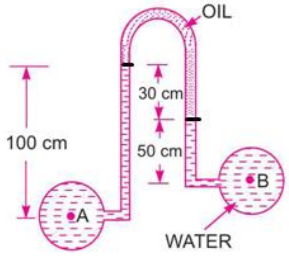
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. State and explain Newton's law of viscosity.	CO1	K1
b. If the specific gravity of a liquid is 0.79, determine its mass density and specific weight.	CO1	K2
c. State Bernoulli's equation with the assumption.	CO2	K1
d. Differentiate turbine and pump.	CO3	K2
e. Explain priming.	CO4	K2

PART – B (15 x 4=60 Marks)

Answer ***ANY FIVE*** the questions	Marks	CO #	Blooms Level
2. a. A rectangular pontoon 10m long, 7m broad and 2.5m deep weighs 686.7 kN. It carries an empty boiler weighing 588.6 N on its upper deck. The centre of gravity of the boiler and the pontoon are their respective centres along a vertical line. Find the Metacentric height. Specific weight of sea water is 10.104KN/m^3.	10	CO1	K3
b. Explain different types of pressure measurement device.	5	CO1	K2
(OR)			
c. An inverted differential manometer connected to two pipes A and B containing water as shown in figure. The fluid in manometer is oil of specific gravity 0.85. Determine the difference of pressure between A and B.	10	CO1	K3



d. With neat sketches, explain the conditions of equilibrium for floating bodies.	5	CO1	K2
3.a. A horizontal venturimeter with inlet diameter 30 cm and throat diameter 15 cm is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20 cm of mercury. Determine the rate of flow. Take Cd=0.98.	10	CO2	K4
b. Define the equation of continuity. State the expression of continuity equation for a three-dimensional flow in different conditions.	5	CO2	K2
(OR)			
c. A pipe line AB of diameter 300 mm and of length 400 m carries water at the rate of 50litres/s. The flow takes place from A to B where point B is 30 metres above A. Calculate the pressure at A if the pressure at B is 19.62 N/cm^2. Take f=0.008	10	CO2	K4
d. Explain different major and minor losses in pipe flow.	5	CO2	K2

4.a.	A pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 litres/s under a head of 30 m. The buckets deflect the jet through an angle of 160^0. Determine the power given by water to the runner and the hydraulic efficiency of the turbine. Assume Cv = 0.98	10	CO3	K4
b.	Explain different parts of a pelton turbine with a diagram.		CO3	K2
	(OR)			
c.	Sketch the velocity vector diagram of both inlet and outlet for a jet striking tangentially to an unsymmetrical moving curved vane. Label all velocity components.	10	CO3	K3
d.	Explain different characteristic curves of the turbine.		CO3	K2
5.a.	The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 RPM. The vane angles of the impeller at the inlet and outlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water.	10	CO4	K4
b.	State the main parts of a centrifugal pump with neat sketch.	5	CO4	K2
	(OR)			
c.	A Kaplan turbine develops 24647.6 kW power under ahead of 39m. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency is 90%. Determine the diameter and the speed of the turbine.	10	CO4	K4
d.	Explain different efficiencies used for the performance analysis of centrifugal pump.	5	CO4	K2

--- End of Paper ---