

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2024**

FLUID MECHANICS & HYDRAULIC MACHINES

[Maximum Marks: 75]

[Time: 3 Hours]

PART-A

I. Answer ‘all’ the following questions in one word or one sentence. Each question carries ‘one’ mark.

(9 x 1 = 9 Marks)

| | | Module Outcome | Cognitive level |
|----|--|----------------|-----------------|
| 1. |is defined as the property of a fluid which offers resistance to the movement of one layer of fluid over another adjacent layer of the fluid. | M1.01 | R |
| 2. |is the pressure exerted normally upon all surfaces which are in contact with the atmosphere. | M1.03 | U |
| 3. | List the two different types of manometers. | M1.05 | R |
| 4. |is defined as the quantity of fluid flowing per second through a section of pipe or a channel. | M2.01 | U |
| 5. | List any two practical applications of Bernoulli's equation. | M2.04 | U |
| 6. |is a pipe of gradually increasing area used for discharging water from the exit of a reaction turbine. | M3.06 | R |
| 7. | If at the inlet of a turbine, the total energy is only kinetic energy, the turbine is called..... | M3.03 | R |
| 8. |is defined as the phenomenon of formation of vapour bubbles and sudden collapsing of the vapour bubbles. | M4.02 | U |
| 9. | The hydraulic machine which converts the mechanical energy into pressure energy by means of centrifugal force is called..... | M4.01 | U |

PART-B

II. Answer any ‘eight’ questions from the following. Each question carries ‘three’ marks.

(8 x 3 = 24 Marks)

| | | Module Outcome | Cognitive level |
|----|---|----------------|-----------------|
| 1. | List any three fluid properties. | M1.01 | U |
| 2. | If the specific gravity of a liquid is 0.85, determine its mass density and weight density. | M1.02 | A |
| 3. | List any three types of fluid flow. | M2.01 | U |
| 4. | List any three minor losses in pipe flow. | M2.07 | R |
| 5. | Write the equations for discharge over a rectangular & triangular notch. | M2.06 | R |

| | | | |
|-----|--|-------|---|
| 6. | A jet of water 75 mm diameter having a velocity of 20 m/s, strikes normally a flat smooth plate. Determine the force exerted on the plate and work done per second on the plate, if the plate is moving in the same direction as the jet with a velocity of 5 m/s. | M3.02 | A |
| 7. | Define unit power of a reaction turbine and give its expression also. | M3.07 | U |
| 8. | Describe priming in centrifugal pump. | M4.02 | R |
| 9. | Define manometric efficiency of pump and give its expression also. | M4.03 | U |
| 10. | Define the concept Negative slip in reciprocating pump. | M4.07 | U |

PART-C

Answer 'all' questions from the following. Each question carries 'seven' marks.

(6 x 7 = 42 Marks)

| | | Module Outcome | Cognitive level |
|-------|--|----------------|-----------------|
| III. | A U-tube mercury manometer is connected to two pipes A & B. Pipe B is 60mm below pipe A. The Specific gravity of liquid in pipe A & B is 1.3 & 0.85 respectively. Mercury level in the left limb is 85mm below the Centre of pipe A. Find the pressure difference between two pipes in N/m^2 if the level difference of mercury in the two limbs of manometer is 150mm. OR | M1.06 | A |
| IV. | With a neat sketch explain Bourdon pressure gauge. | M1.05 | U |
| V. | Explain hydraulic coefficients of orifice and give the relation between them. OR | M2.06 | U |
| VI. | The water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through the pipe is 35 litres/sec. The section is 6 m above the datum and section 2 is 4 m above the datum. If pressure at section 1 is $39.24 N/cm^2$, Find the intensity of pressure at section 2. | M2.03 | A |
| VII. | State Bernoulli's equation and list out limitations of the Bernoulli's theorem. OR | M2.02 | U |
| VIII. | A horizontal venturimeter with inlet and throat diameters 30cm and 15cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and throat is 20cm of mercury. Determine the rate of flow. Take $C_d = 0.98$. | M2.05 | A |
| IX. | With a neat sketch explain layout of hydroelectric power plant. OR | M3.03 | U |
| X. | With a neat sketch explain Pelton turbine. | M3.05 | U |
| XI. | With a neat sketch explain Kaplan turbine. OR | M3.05 | U |
| XII. | Explain the classification of Hydraulic turbines. | M3.03 | U |
| XIII. | With a neat sketch explain working of Centrifugal pump. OR | M4.01 | U |
| XIV. | With a neat sketch explain working of Hydraulic ram. | M4.08 | U |
