

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE, NOVEMBER-2021**

**FLUID MECHANICS & PNEUMATICS**

[Maximum marks: 75]

(Time: 2.15 Hours)

**PART – A**

I (Answer any *three* questions in one or two sentences. Each question carries 2 marks)

1. List any two characteristics of an ideal fluid.
2. Write the continuity equation applicable to an incompressible fluid.
3. Define ‘viscosity index’ of hydraulic oil.
4. Draw the circuit symbol of FRL unit.
5. What is meant by duplex type pneumatic cylinder? (3 x 2 =6)

**PART – B**

II (Answer any *four* of the following questions. Each question carries 6 marks)

1. The intensity of pressure of water at a point is 320 kPa. Represent this pressure in terms of Head of water and Head of mercury.
2. Define the terms-Local atmospheric pressure, Standard atmospheric pressure, Gauge pressure and Vacuum pressure.
3. Explain about steady flow, uniform flow and irrotational flow.
4. Describe about the head losses in pipes.
5. List any six application of hydraulic power.
6. Describe the working of an external gear pump with a simple sketch.
7. Compare the pneumatic system with hydraulic system. (4 x 6= 24)

**PART – C**

(Answer *any of the three units* from the following. Each full question carries 15 marks)

**UNIT –I**

- III. (a) The pressure drop of water flowing through a pipe is measured by a vertical u-tube manometer. The density of the manometric liquid is  $2000 \text{ kg/m}^3$  and the difference in height of this liquid in both limbs is 10cm. Calculate the pressure drop between the tapping points (in Pa) (9)
- (b) A circular plate is 2 m in diameter and is held vertically in water. The centre of the plate is 2.5m below the free surface of water. Find the total pressure exerted by water on plate, with its unit. (6)

OR

- IV.(a) Calculate the specific weight, specific mass, specific volume and specific gravity of a liquid of  $3 \text{ m}^3$  volume with weight 27 kN. (9)
- (b) A ship floating in sea water displaces  $108 \text{ m}^3$  of water. The specific gravity of the sea water is 1.2. Determine the weight of the ship (in N). (6)

**UNIT-II**

- V (a) Water of  $9.879 \text{ kN/m}^3$  flow through a pipe AB of length 10m and of uniform cross section at  $0.3 \text{ m}^3/\text{s}$ . The end 'B' is above the end 'A' and pipe makes  $30^\circ$  to horizontal. For a pressure of 12 kPa at 'B', compute the corresponding pressure at 'A'(in Pa). (9)
- (b) A triangular notch is having an angle of 60 degree and coefficient of discharge 0.60. Find the discharge (in  $\text{m}^3/\text{s}$ ) over this notch, when the head over the notch is 0.3m. (6)

OR

- VI. (a) Water is flowing through a pipe length 1000 m and diameter 200 mm at a rate of  $0.07 \text{ m}^3/\text{s}$ . If the value of Darcy friction factor for this pipe is 0.02 and the density of water is  $1000 \text{ kg/m}^3$ , what is the pumping power (in kW) required for maintaining the flow through the pipe. (9)
- (b) A venturimeter of 20 mm throat diameter is used to measure discharge of water in a horizontal pipe of 40 mm diameter. The piezometric pressure head difference between pipe and throat section is 3 m of water. What is the theoretical discharge of water (in  $\text{m}^3/\text{s}$ ) through the pipe. (6)

**UNIT-III**

- VII.(a) Explain about Rotary type hydraulic actuator and linear motion type hydraulic actuator using simple sketches (9)
- (b) Using a suitable sketch, describe the working of a hydraulic accumulator. (6)

OR

- VIII.(a) Draw a basic hydraulic circuit using standard symbols and name the components. (9)
- (b) Explain the function of pressure control valves, flow control valves and direction control valves in a hydraulic circuit. (6)

**UNIT-IV**

- IX. (a) Using a suitable diagram, explain the working of pneumatically operated wedge clamp. (9)
- (b) List any six advantages of hydro-pneumatic system. (6)

OR

- X. (a) Describe the working of an air controlled hydraulic circuit with the help of a diagram. (9)
- (b) Explain the function of an air filter with a simple sketch. (6)

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