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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER - 2024

FLUID MECHANICS AND PNEUMATICS

[Maximum Marks: **100**]   [Time: **3** Hours]

PART-A
[Maximum Marks: **10**]

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

1. Define Specific gravity of fluid.

2. State Newtonian and non-newtonian   fluid.

3. Define rate of flow of fluid.

4. List various types of hydraulic cylinders.

5. List the functions of air filter.   (5 x 2 = 10)

PART-B
[Maximum Marks: **30**]

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

1. Explain about Meta centre and meta centric height with a neat figure.

2. Discuss the Surface tension and Capillarity.

3. Explain the continuity equation of flow with derivation.

4. Explain about types of fluid flow.

5. Explain the working of screw pump with a neat sketch.

6. Describe the working pressure control valve.

7. Explain about FRL unit.   (5 x 6 = 30)

PART-C
[Maximum Marks: **60**]
(Answer *one* full question from each Unit. Each full question carries **15** marks)

UNIT – I

III.   a. A simple U - Tube manometer containing mercury is connected to a pipe in which a

fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of

the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference

of mercury level in the two limbs is 40 cm and height of fluid in the left from the Centre

of pipe is 15 cm below.   (8)

b. Explain the working of piezometer tube with a neat figure.   (7)

OR

IV. a. The right limb of a simple U - Tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The Centre of the pipe is 12 cm below the level of mercury in the right limb. Find pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm. (8)

b. A rectangular plane surface 2 m wide and 3 m deep lies in water in such a way that its plane makes an angle of 30° with the free surface of water. Determine the total pressure and position of centre of pressure when the upper edge is 1.5 m below the free water surface. (7)

UNIT – II

V. a. An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take C_d= 0.98. (8)

b. Explain about the different types of loss of head in pipes. (7)

OR

VI. a. A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. (8)

b. Derive and explain Bernoulli's equation. (7)

UNIT- III

VII. a. Illustrate the elements of Hydraulic system and explain each component. (8)

b. Describe the types of accumulator. (7)

OR

VIII. a. Draw the circuit diagram of automatic cylinder reciprocating circuit and explain. (8)

b. Explain about the types of hydraulic actuators. (7)

UNIT - IV

IX. a. Draw the block diagram of Pneumatic system and explain each component. (8)

b. Explain about the working of solenoid valve with a neat sketch. (7)

OR

X. a. Explain the principle of operation of power operated pneumatic chuck. (8)

b. Explain about types of air cylinders. (7)

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