

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE –APRIL -2021.

**MECHANICAL ENGINEERING**

(Maximum Marks : 100)

[Time : 3 hours]

**PART-A**

(Maximum Marks : 10)

Marks

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

1. Define uniform flow and non uniform flow.
2. State Bernoulli's Theorem.
3. Explain water hammer.
4. Explain impulse steam turbine.
5. Explain the term slip of a pump.

(5x2=10)

**PART - B**

(Maximum Marks : 30)

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

1. State atmospheric, gauge, Vacuum and absolute pressure.
2. Explain the working of a differential manometer with neat sketch.
3. List the limitations of Bernoulli's theorem.
4. Define laminar flow and turbulent flow.
5. Explain with the neat sketch the working of a Simple boiler.
6. Classify the water turbines.
7. Study the working and various parts of centrifugal pumps.

(5x6 =30)

**PART - C**

(Maximum Marks : 60)

(Answer *one full* question from each unit. Each question carries 15 marks)

**UNIT I**

**III** (a) A U-tube manometer is used to measure the pressure of water in a pipe line, which is in excess of atmospheric pressure. The right limb of manometer contains mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipe line is reduced to  $9810 \text{ N/m}^2$ , calculate the new difference in the level of mercury. Sketch the arrangements in both cases. (8)

(b) A differential manometer is connected at the two points A and B of two pipes as shown in figure-A. The pipe A contains liquid of specific gravity 1.5, while pipe B contains a liquid of specific gravity 0.9. The pressures at A and B are  $9.81 \times 10^4 \text{ N/m}^2$  and  $17.66 \times 10^4 \text{ N/m}^2$  respectively. Find the difference in mercury level in the differential manometer. (7)

**OR**

**IV** (a) An inverted differential manometer having an oil of specific gravity 0.75 was connected to two different pipes carrying water under pressure as shown in figure B. Find the pressure in the pipe B in terms of KPa, if the manometer reads as shown in the figure. Take pressure in the pipe A as 1.5 metre of water. (8)

(b) A simple manometer containing mercury is used to measure the pressure of water flowing in a pipe line. The mercury level in the open tube is 60 mm higher than that on the left tube. If the height of water in the left tube is 50 mm, determine the pressure in the pipe in terms of head of water. (7)

#### **UNIT- II**

**V** (a) Explain with neat sketch the working of Venturimeter. (8)

(b) A pipeline carrying oil of specific gravity 0.87, changes in diameter from 200 mm diameter at position A to 500 mm diameter at position B which is 4 m at a higher level. If the pressures at A and B are  $9.81 \text{ N/cm}^2$  and  $5.886 \text{ N/cm}^2$  respectively and the discharge is 200 l/s, determine the loss of head. (7)

**OR**

**VI** (a) Explain the critical velocity and Reynolds number (8)

(b) Find the diameter of a pipe of length 2000 m when the rate of flow of water through the pipe is 200 lit/s and the head lost due to friction is 4.0 m. Take the value of  $C=50$  (7)

#### **UNIT- III**

**VII** (a) Explain with neat sketch the working of Lamont boiler (8)

(b) Explain the working of impulse and reaction turbines (7)

**OR**

**VIII** (a) Compare fire tube and water tube boilers (8)

(b) Explain the working principle of steam turbines (7)

#### **UNIT – IV**

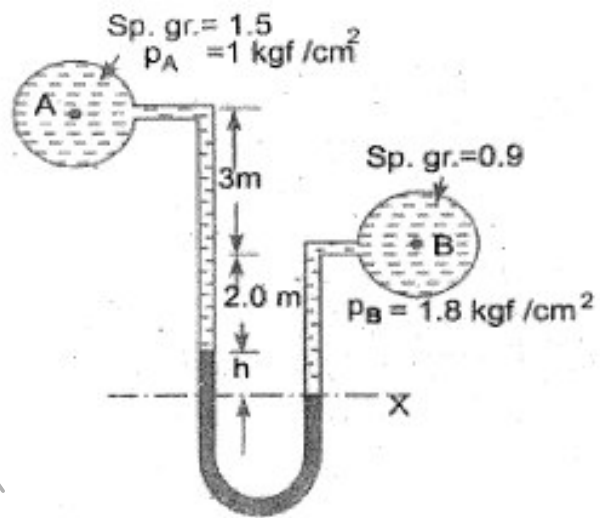
**IX** (a) Explain with the sketch the working of Pelton wheel (8)

(b) Explain with neat sketch the working of air vessel (7)

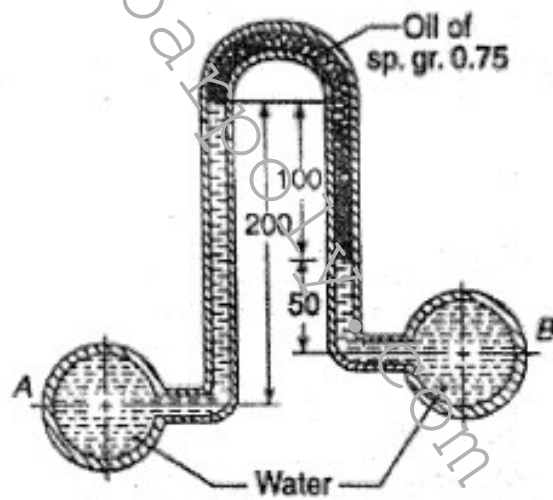
**OR**

**X** (a) Explain with the sketch the working of a reciprocating pump (8)

(b) Explain the guide mechanism of reaction turbine. (7)



**Figure A**



**Figure B**

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