

**THIRD SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/  
TECHNOLOGY— MARCH, 2015**

**FLUID MECHANICS AND PNEUMATICS**

(Common for ME and TD)

[Time : 3 hours

(Maximum marks : 100)

PART—A

(Maximum marks : 10)

Marks

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

1. Explain absolute pressure and gauge pressure.
2. What is the use of venturimeter ?
3. Write Darcy's formula for loss of head due to friction with expansion.
4. What is the purpose of an accumulator ?
5. Name any three machines using pneumatic chucks. (5×2=10)

PART—B

(Maximum marks : 30)

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

1. Explain the working principle of Bourdon tube pressure gauge with a simple sketch.
2. Explain the following :  
(i) Relative density (ii) Surface tension (iii) Compressibility.
3. Explain the concept of continuity equation of liquid flow.
4. What are the limitations of Bernoulli's theorem ?
5. Explain notches and different types of notches.
6. Explain the working of non return valves with neat sketch.
7. Explain Venturimeter with figure. (5×6=30)



## PART—C

(Maximum marks : 60)

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

## UNIT—I

- III (a) Calculate the specific weight, specific mass and specific gravity of a liquid having a volume of  $4\text{m}^3$  and weight 30KN. 6
- (b) A U tube differential manometer containing mercury is connected on one side to pipe A containing carbon tetrachloride (sp. gr. 1.6) under a pressure of 120kpa, and on the other side to pipe B containing oil (sp. gr. 0.8) under a pressure of 200kpa. The pipe A lies 2.5m above the pipe B and mercury level in the limb communicating with pipe A lies 4m below the pipe A. Determine the difference in the level of mercury in the two limbs of manometer. 9  
Take weight of water =  $9.81\text{kN/m}^3$ .

OR

- IV (a) The right limb of a U tube manometer containing mercury is open to the atmosphere while left limb is connected to the pipe through which flows a fluid of specific gravity 0.85. The centre of the pipe lies 15cm below the level of mercury in the right limb. If the difference of mercury level in the two limbs is 25cm, determine the pressure of the fluid of the pipe in  $\text{N/m}^2$ , Kpa, bar and  $\text{N/mm}^2$ . 6
- (b) (i) Define total pressure. 3  
(ii) A rectangular plane surface 3m wide and 5m deep is inclined in water is such a way that the plane makes an angle of  $30^\circ$  with free surface of water determine the total pressure when the upper edge of the plate is 3m below the free surface of the water. 6

## UNIT—II

- V (a) Name and define the hydraulic coefficients, state the relationship between them. 6  
(b) Water flow over a rectangular notch of 3m wide and 0.4m depth and afterwards passes through a triangular notch ( $\theta = 90^\circ$ ). Taking coefficient of discharge for rectangular notch and triangular notches are 0.62 and 0.6 respectively. Find the depth of water over the triangular notch. 9

OR

- VI (a) Write an equation of loss of head due to sudden enlargement, loss of head due to sudden contraction with simple figure. 6  
(b) Find the maximum power transmitted through a pipe 1km long and 150mm diameter discharging  $0.1\text{m}^3/\text{s}$  of water. The pressure at the supply end is  $6\text{N/mm}^2$  and  $f = 0.0075$ . Find also efficiency of transmission. 9



## UNIT—III

- VII (a) Draw the sketch and explain the function of simple pressure relief valve. 6
- (b) Explain the function of following elements :
- (i) Oil reservoir      (iii) Oil pump
- (ii) Filter.              (iv) Actuator. 9

OR

- VIII (a) What are the functions of control valves ? 6
- (b) Explain the working of the hydraulic motor with simple sketch. 9

## UNIT—IV

- IX (a) Write any six advantages of pneumatic holding device. 6
- (b) Describe the working of pneumatic mandrel with the help of circuit diagram. 9

OR

- X (a) What are the areas of applications of hydro pneumatic system ? 6
- (b) Explain the air control hydraulic valve with neat sketch. 9
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