

THIRD SEMESTER DIPLOMA EXAMINATION IN ELECTRICAL AND  
ELECTRONICS ENGINEERING—OCTOBER, 2013

MECHANICAL ENGINEERING

[Time : 3 hours

(Maximum marks : 100)

Marks

PART—A

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

1. Define absolute pressure.
2. What you mean by steady flow ?
3. What is hydraulic gradient line ?
4. What is the function of a boiler ?
5. Write the classification of water turbines.

(5×2=10)

PART—B

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

1. Determine the gauge and absolute pressure at a point which is 2m below the free surface of water. Take atmospheric pressure as 101043 N/m<sup>2</sup>.
2. Name different types of energy of a flowing fluid. Give expressions for them.
3. List the different types of fluid flow.
4. Write six comparisons between fire tube and water tube boilers.
5. What are the elements of steam generator ?
6. Define hydraulic efficiency, mechanical efficiency and overall efficiency of turbines.
7. Briefly describe about pumps.

(5×6=30)

PART—C

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

UNIT - I

- III (a) Derive an expression to find the total pressure on a horizontal plane surface immersed in the fluid. 7
- (b) The pressure of water in pipe line was measured by means of a simple manometer containing mercury. The mercury level in the open tube is 150 mm, higher than that on the left tube. The height of water in the left tube is 40mm. Determine the static pressure in the pipe. 8

OR

- IV (a) What is a manometer ? How they are classified ? 7
- (b) A simple u-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.85 and having a vacuum pressure is flow. The other end is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in two limbs is 500 mm and the height of fluid in the left from the centre of pipe is 150 mm below. 8

## UNIT - II

- V (a) Explain the constructional details of a venturimeter with the help of a neat sketch. 7
- (b) A horizontal venturimeter with inlet and throat diameters 300 mm and 150 mm is used to measure the flow rate of water. The reading of differential manometer connected to the inlet and throat is 200 mm of mercury. Determine the rate of flow. Take the  $C_d = 0.98$ . 8

OR

- VI (a) Explain the phenomenon of water hammer. 7
- (b) Water is flowing through a pipe of 250 mm in diameter and 100 mm long with a velocity 2.5 m/s. Find the head loss due to friction using Darcy's formula and Chezy's formula. Assume  $f = 0.005$  and  $C = 55$ . 8

## UNIT - III

- VII (a) Briefly describe the working principle of steam turbines. 7
- (b) Explain the simple vertical boiler with neat sketch. 8

OR

- VIII (a) What is boiler mountings and accessories ? What are the uses of it ? 7
- (b) Draw a neat sketch of Lamont boiler and mark all parts. 8

## UNIT - IV

- IX (a) Explain the working principle of pelton wheel with neat figure. 7
- (b) Explain the working principle of reciprocating pump. 8

OR

- X (a) Explain the working principle of Kaplan turbine with neat figure. 7
- (b) Explain the working principle of a centrifugal pump. 8