DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

MECHANICAL ENGINEERING

[*Time* : 3 hours

(Maximum marks : 100)

Marks

PART — A

(Maximum marks : 10)

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

1. What is the use of a differential manometer ?

2. Define steady flow.

3. State Bernoulli's theorem.

4. Name the four strokes of a four stroke IC engine.

5. Define the term "Specific speed of turbine".   (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Determine the gauge and absolute pressure at a point which is 3 m below the frees surface of water. Take atmospheric pressure as 101325 Pa.

2. With a neat diagram, explain how a differential manometer can be used to find the pressure difference between two pipes.

3. With a neat diagram, explain the constructional details of a venturimeter.

4. How to calculate Reynolds number for a flow ? Explain how Reynolds number can be used to classify fluid flow to laminar and turbulent.

5. Write classification of boilers.

6. Explain about multistage centrifugal pumps.

7. Define hydraulic efficiency, mechanical efficiency and overall efficiency of a hydraulic turbine.   (5×6 = 30)

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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 0.85 and having a vacuum pressure is flowing. The right limb of the manometer is open to the atmosphere. Find the vacuum pressure in the pipe, if the difference in mercury level in two limbs is 500 mm and the distance from the centre of pipe to the mercury level in the left limb is 150 mm.   8

(b) Convert an intensity of pressure 39.23 kPa into the corresponding pressure head in terms of (a) m of kerosene (b) m of water. Relative density of kerosene is 0.8.   7

OR

IV (a) U-tube Mercury manometer is connected to two pipes A and B. The left limb is connected to pipe A and right limb is connected to pipe B. Pipe B is 60 mm below pipe A. The specific gravity of liquid in pipe A and pipe B is 1.6 and 0.85 respectively. Mercury level in the left limb is 80 mm below the centre of pipe A. Find the pressure difference between two pipes in Pa, if the level difference of mercury in the two limbs of the manometer is 120 mm.   8

(b) Find the gauge pressure and absolute pressure in Pa at a point 4m below the free surface of a liquid of specific gravity 1.2, if the atmospheric pressure is equivalent to 750 mm of mercury.   7

UNIT — II

V (a) 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 C_d=0.98.   7

(b) Water flowing through a pipe of 250 mm in diameter and 100 m long with a velocity 2.5 m/s. Find the head loss due to friction using Darcy's formula and Chezy's formula. Assume coefficient of friction(f) = 0.005 and Chezy's constant (C) = 55.   8

OR

VI (a) A horizontal venturimeter is provided in a pipeline 300 mm diameter carrying water. The throat diameter is 150 mm. If the pressure in the pipe is 160 kPa and that at the throat is 350 mm of Hg. Find the discharge. Cd = 0.98.   8

(b) A pipe of 240 mm in diameter is suddenly enlarged to 480 mm in diameter. Determine the loss of head, when the discharge is 32.75 litres/second.   7

Unit — III

VII   (a)   With neat diagrams, explain the working of a four stroke petrol engine.   8

      (b)   Explain about different types of steam turbines.   7

Or

VIII   (a)   What are the differences between a two stroke engine and a four stroke engine ?   8

      (b)   With the help of a diagram, explain the different parts of a boiler.   7

Unit — IV

IX   (a)   With a neat diagram, explain the working of a centrifugal pump.   8

      (b)   Write the differences between impulse and reaction turbines.   7

Or

X   (a)   With a neat diagram, explain the working of Francis turbine.   8

      (b)   With a neat diagram, explain the working of a reciprocating pump.   7

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