TED (15/19) – 3034
(Revision – 2015/19)

1510230143

Reg.No……..
Signature……...

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER – 2023

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. Write down the relation among absolute, gauge and atmospheric pressure.
2. Show the mathematical relation between pressure and pressure head.
3. Draw the constructional features of a venturimeter.
4. What are the two types of steam turbines?
5. Define specific speed of a hydraulic turbine.

(5x2=10)

PART – B
(Maximum Marks : 30)

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

1. Write down Bernoulli's equation and explain the terms involved.
2. Distinguish between steady *vs* unsteady flows and uniform *vs* non-uniform flows.
3. Explain the phenomenon of water hammer in pipes.
4. Classify the IC engines based on type of ignition.
5. Compare water tube and fire tube boilers.
6. Name any two reaction water turbines and name the important components.
7. Explain the following terms with respect to hydraulic pumps:
   (a) impeller (b) foot valve (c) net head. (5x6=30)

PART – C
(Maximum Marks : 60)
(Answer **one full** question from each unit. Each full question carries 15 marks)

UNIT – I

III. (a) Convert a pressure head of 15 m of water to
(i) meters of oil of specific gravity 0.75 and
(ii) meters of mercury of specific gravity 13.6. (9)

(b) A piezometer measures the pressure in a pipeline carrying water. The piezometer reading is 253 mm measured from the centerline of the pipe. At this point, what are the gauge pressure and the absolute pressure in N/m^2? Take atmospheric pressure as equivalent to 10.3 m of water absolute. (6)

OR

IV. (a) In a pipeline water is flowing. A manometer is used to measure the pressure drop for flow through the pipe. The difference in level was found to be 20 cm. If the manometric fluid is CCl_4, find the pressure drop in S.I units (density of CCl_4 = 1.596 g /cm^3). If the manometric fluid is changed to mercury (ρ = 13.6gm/cm^3). What will be the difference in level? (9)

(b) U-tube manometer containing mercury was used to find the negative pressure in the pipe, containing water. The right limb was open to the atmosphere. Find the vacuum pressure in the pipe, if the difference of mercury level in the two limbs was 100 mm and height of water in the left limb from the centre of the pipe was found to be 40 mm below. (6)

UNIT – II

V. (a) A venturimeter is used to measure liquid flow rate of 7500 litres per minute. The difference in pressure across the venturimeter is equivalent to 8 m of the flowing liquid. The pipe diameter is 19 cm. Calculate the throat diameter of the venturimeter. Assume the coefficient of discharge for the venturimeter as 0.96. (9)

(b) Compare a venturimeter and an orifice meter. (6)

OR

VI. (a) Water at a density of 998 kg/m^3 and kinematic viscosity of $1x10^{-6}$ m^2/s flows through smooth tubing at a mean velocity of 2 m/s. If the tube diameter is 30 mm, calculate the pressure gradient per unit length necessary. Assume that the friction factor for a smooth pipe is given by 16 /Re for laminar flow and $0.079/Re^{¼}$ for turbulent flow. (9)

(b) Water is flowing in a fire hose with a velocity of 1.0 m/s and a pressure of 200000 Pa. At the nozzle the pressure decreases to atmospheric pressure (101300 Pa), there is no change in height. Use the Bernoulli equation to calculate the velocity of the water exiting the nozzle. (6)

UNIT –III

VII. (a) Explain the working of a 4 stroke petrol engine with neat sketches. (8)

(b) Explain the working of a water tube boiler with a neat sketch. (7)

OR

VIII. (a) Illustrate the working of a 2 stroke engine with neat diagrams. (8)

(b) Classify steam turbines based on energy available in the steam at inlet and explain with neat diagrams. (7)

UNIT – IV

IX. (a) Explain the working of a Kaplan turbine with a neat sketch. (8)

(b) Explain the concept of multistage pumps. (7)

OR

X. (a) Classify the hydraulic pumps and explain any one of them with a neat diagram. (8)

(b) Illustrate the working of any one impulse water turbine with a neat sketch. (7)

****