

THIRD SEMESTER DIPLOMA EXAMINATION IN AUTOMOBILE
ENGINEERING—MARCH, 2013

FLUID MECHANICS AND MACHINERY

[Time : 3 hours

(Maximum marks : 100)

PART—A

(Maximum marks : 10)

Marks

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

1. Define Newtonian fluid.
2. Differentiate between laminar flow and turbulent flow.
3. Define cavitation.
4. Define the term Pump.
5. Define fire point of an oil.

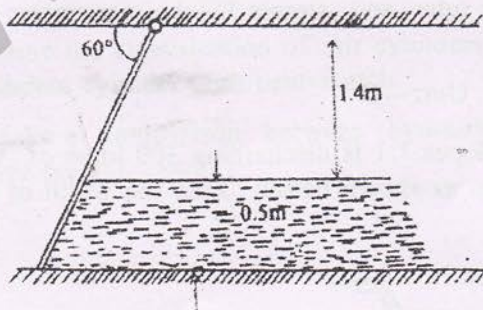
(5×2=10)

PART—B

(Maximum marks : 30)

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

1. A horizontal passage 1400 mm × 1400 mm has its outlet covered by a plane flap inclined at 60° with the horizontal and is hinged along the upper horizontal edge of the passage. If the depth of the flowing water is 500 mm in the passage, determine the thrust on the gate.



2. Explain briefly about any six types of fluids.
3. Briefly describe any four classifications of fluid flow.
4. A right angled V-notch was used to measure the discharge of a centrifugal pump. If the depth of water at V-notch is 200 mm, calculate the discharge over the notch in litres per minute. Assume coefficient of discharge as 0.62.

5. Explain the working of a centrifugal pump with neat sketch.
6. A double acting reciprocating pump has a stroke of 300 mm and a piston of diameter 150 mm. The delivery and suction heads are 26 m and 4 m respectively including friction heads. If the pump is working at 60 r.p.m., find power required to drive the pump with 80% efficiency.
7. Write down four disadvantages of a pneumatic system. (5×6=30)

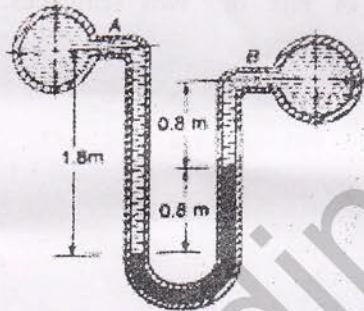
PART—C

(Maximum marks : 60)

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

UNIT—I

- III (a) A differential manometer containing mercury was used to measure the difference of pressure in two pipes containing water as shown below. Find the difference of pressures in the pipes, if the manometer reading is 0.8 m.



- (b) A semi circular plate 1 m diameter is placed vertically in a liquid of specific weight 9 KN/m^3 with its diameter coincides on the free liquid surface. Find the total pressure on the plate.

OR

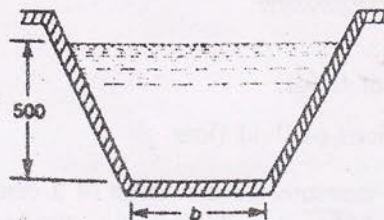
- IV (a) Describe briefly about the following four properties of a fluid :

- (i) Density (iii) Specific volume
(ii) Specific weight (iv) Specific gravity.

- (b) Distinguish between Piezometer tube and simple U-tube manometer with neat sketches.

UNIT—II

- V (a) A trapezoidal notch with side slopes 1:1 is discharging 300 liters of water per second under a head of 500 mm as shown below. Find the width of the notch at its bottom. Take $C_d = 0.6$.



(b) Water flows through a pipe of 200 mm in diameter 60 m long with a velocity 2.5 m/s. Find the head loss due to friction using :

- (i) Darcy's formula and (ii) Chezy's formula (Take $f = 0.005$, $C = 55$).

8

OR

VI (a) The diameter of a pipe changes from 200 mm at a section 5 m above datum to 50 mm at a section 3 m above datum. The pressure of water at first section is 500 kPa. If the velocity of flow at the first section is 1 m/s, determine the intensity of pressure at the second section.

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(b) A 60 mm diameter orifice is discharging water under a head of 9 m. Calculate the actual discharge in the orifice in liters per second and actual velocity of the jet in m/s at vena contracta, if $C_d = 0.625$ and $C_v = 0.98$.

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UNIT—III

VII (a) Classify different types of positive displacement pumps and explain Vane pump with neat sketch.

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(b) Explain the necessity and functioning of an air-vessel in a reciprocating pump with a neat diagram.

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OR

VIII (a) A centrifugal pump having overall efficiency of 65%, is required to handle brine (sp.gr. 1.2) and gasoline (sp.gr. 0.7). The discharge of each of these liquids is 60 lts/s against a net pressure of 500 KPa. Show that the same power is required for handling both the above liquids having different specific gravities.

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(b) Explain the working of a double acting single cylinder reciprocating pump with neat sketch.

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UNIT—IV

IX (a) Explain the working of simple globe valve with neat sketch.

5

(b) Sketch a hydraulic system showing the basic components and mention the functions of each.

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OR

X (a) Name the classification of air cylinders and describe combined cylinders type tandem cylinder with neat sketch.

10

(b) Make a comparison between hydraulic system and pneumatic system. (Any five points).

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