

THIRD SEMESTER DIPLOMA EXAMINATION IN AUTOMOBILE
ENGINEERING—OCTOBER, 2012

FLUID MECHANICS AND MACHINERY

[Time : 3 hours

(Maximum marks : 100)

PART—A

Marks

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

1. Define viscosity.
2. State the equation of continuity.
3. Define priming of pump.
4. Define Flash point of an oil.
5. Differentiate between uniform flow and non-uniform flow.

(5×2=10)

PART—B

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

1. Calculate the Mass density, Specific volume and specific gravity of a liquid having a volume of 3m^3 and weight 4 KN.
2. A simple manometer containing mercury is used to measure the pressure of water flowing in a pipeline. The mercury level in the open tube is 60 mm higher than that on the left tube. If the height of water in the left tube is 50 mm, determine the pressure in the pipe in terms of head of water.
3. A trapezoidal notch of 1.2 m wide at the top and 450 mm at the bottom is 300 mm high. Find the discharge through the notch, if the head of water is 225 mm. Take co-efficient of discharge as 0.6.
4. A centrifugal pump having overall efficiency of 62%, is required to handle brine (sp.gr. 1.19) and gasoline (sp.gr. 0.7). The discharge of each of these liquids is 50 lts/s against a net pressure of 400 kPa. Show that the same power is required for handling both the above liquids having different specific gravities.
5. Explain the working of a reciprocating pump with neat diagram.
6. Compare six merits and demerits of hydraulic system and pneumatic system.
7. Define the following :
 - (i) Viscosity index
 - (ii) Oxidation stability
 - (iii) Demulsibility.

(5×6=30)

PART—C

Mark

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

UNIT—I

- III (a) Derive the equations of pressure difference between two pipe lines by using the following two manometers with neat sketches. 10
 (i) Ordinary differential manometer (ii) Inverted differential manometer. 5
 (b) Describe the working of Bourdon tube pressure gauge with neat sketch.

OR

- IV (a) Write short notes on Density, Specific gravity, Specific weight and Specific volume of a fluid. 8
 (b) A circular plate 1.2 m diameter is immersed vertically in oil of specific weight 8.5 kN/m^3 , such that its centre is 4 m below the oil surface. Find the intensity of pressure and total pressure on the plate. 7

UNIT—II

- V (a) Water flows through a pipe of 300 mm in diameter 70 m long with a velocity 3m/s. Find the head loss due to friction using : 8
 (i) Darcy's formula
 (ii) Chezy's formula (Take $f = 0.005$ and $C = 55$). 7
 (b) (i) Explain the energy losses in pipe (ii) Describe water hammer.

OR

- VI (a) Distinguish between rectangular and triangular notch along with their equations of discharge and neat sketches. 8
 (b) A 50 mm diameter orifice is discharging water under a head of 8 m. Calculate the actual discharge in the orifice in litres per second and actual velocity of the jet in m/s at vena contracta, if $C_d = 0.63$, and $C_v = 0.98$. 7

UNIT—III

- VII (a) Classify different types of positive displacement pumps and explain lobe pump with neat sketch. 7
 (b) A double acting reciprocating pump has a stroke of 350 mm and a piston of diameter 160 mm. The delivery and suction heads are 30 m and 5 m respectively including friction heads. If the pump is working at 70 r.p.m., find power required to drive the pump with 75% efficiency. 8

OR

- VIII (a) Define a centrifugal pump. Explain the working with a neat figure indicating the parts. 8
 (b) A centrifugal pump delivers 40 litres of water per second to a height of 25 m. through a pipe 86 m long and 95 mm diameter. If the overall efficiency of the pump is 80%, find the power required to drive the pump. Take $f = 0.013$. 7

UNIT—IV

- IX (a) Illustrate the working of non-return valve and butterfly valve with neat sketches. 8
 (b) Briefly explain with sketch, the function and working of relief valve used in pneumatic system. 7

OR

- X (a) Describe the working of simple check valve and right angle check valve with neat sketches. 8
 (b) Summarize the advantages of pneumatic system. (Any seven points). 7