

FOURTH SEMESTER DIPLOMA EXAMINATION IN CIVIL ENGINEERING—
OCTOBER, 2014

HYDRAULICS

[Time : 3 hours]

(Maximum marks : 100)

PART—A

(Maximum marks : 10)

Marks

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

1. What is the difference between ideal fluid and real fluid ?
2. Write the condition where the inverted U-tube differential manometer is used.
3. Distinguish between laminar flow and turbulent flow.
4. What do you understand by priming of centrifugal pumps ?
5. What is a multi stage pump ?

(5×2=10)

PART—B

(Maximum marks : 30)

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

1. Pipe A carries a liquid of specific gravity 1.5, and it is 50 mm higher than pipe B which carries a liquid of specific gravity 0.9. The pipes are connected to the two ends of a U-tube containing mercury. Find out the pressure difference between two points if the difference in mercury level is 120 mm and the raised mercury surface on the side of pipe A falls below the centreline of pipe A by 70 mm.
2. An oil of specific gravity 0.9 is flowing through a venturimeter 100 mm × 40mm. A mercury manometer used to find out the ventury head shows the mercury level difference in its two limbs as 150 mm. Determine the flow of oil in litres per second if the ventury co-efficient is 0.98. Assume specific gravity of mercury as 13.6.
3. How will you find out co-efficient of contraction experimentally ?
4. With the help of a neat sketch, describe the working of a Pelton wheel.
5. Compare centrifugal pump with reciprocating pump.
6. Find the maximum discharge over a flat topped broad crested weir 40 m long with rounded entrance when the upstream level of water is 1 m above the crest of the weir. Assume $C_d = 0.6$. Also determine the new discharge over the weir considering velocity of approach when the channel approaching the weir is 50m^2 as its cross sectional area.
7. Derive Chezy's formula for discharge through an open channel.

(5×6=30)

PART—C

(Maximum marks : 60)

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

UNIT—I

- III (a) Differentiate between pressure gauges and manometers, explain with examples. 7
- (b) A trapezoidal plate is immersed in water in such a way that its broader of the two parallel sides 8m and 4m lies at the least depth of 2 m. If the two parallel sides are separated by 3m and the surface of the plate makes an angle of 60° with free water surface. Find the total pressure and depth of centre of pressure on one face of the trapezoidal plate. 8

OR

- IV (a) What are the different hydraulic energies? Explain briefly. 7
- (b) (i) In which condition an inverted differential manometer is used. 4
- (ii) An inverted differential manometer is connected between two pipes A and B carrying a liquid of specific gravity 1.6. The pipe A is 100 mm above the pipe B. The specific gravity of the manometric liquid is 0.85. If the manometer reads 500 mm, find the difference of pressure between the two points in kN/m^2 . The level of manometric liquid in the pipe B coincides with the centre line of pipe A. 4

UNIT—II

- V (a) Two identical orifices having same co-efficient of velocity are placed in the tank one above the other in such a way that the bottom orifice is 500mm above the base of the tank and top orifice 4m above the bottom orifice. The tank is placed on the horizontal level ground. If the jet from the top orifice strike the ground at two times the distance where the jet from the bottom orifice strike the same, find out the total depth of water in the tank. 7
- (b) Sketch and explain the main components of a centrifugal pump. 8

OR

- VI (a) A tank of uniform cross sectional area of 1.44m^2 contains water to a depth of 2 m. For how long an orifice 50 mm diameter shall be kept open at the base so that the depth of water in the tank decreases to 1 m. What will be time taken to empty the tank completely? Assume $C_d = 0.6$. 7
- (b) What is the function of a draft tube? What are the different types of draft tubes? Explain. 8

UNIT—III

- VII (a) Derive the equation for discharge through a triangular notch. 7
- (b) What is a Cippolette weir? Deduce an expression for discharge over a Cippolette weir. 8

OR

	Marks
VIII (a) Write the classification of weirs.	7
(b) Write short notes on :	
(i) Velocity of approach	(iii) Surge tank
(ii) Pen stock	(iv) Tail race
	8

UNIT—IV

IX (a) Derive Darcy's formula for loss of head due to friction in pipes.	7
(b) A rectangular channel is 9 m wide and 3 m deep is used to carry water. Calculate what bed slope should be maintained for a discharge of $65\text{m}^3/\text{s}$. Take Chezy's constant as 60.	8

OR

X (a) A straight pipe 300 mm diameter and 600 m length connects two reservoirs. If the difference of water levels in the two reservoirs is 6 m, find the discharge through the pipe in litres/second. Assume $f = 0.01$.	7
(b) What do you understand by most economical section of a channel? Derive an expression for the condition of most economical rectangular section.	8