

B.Tech II Year I Semester (R13) Regular &amp; Supplementary Examinations December 2015

**FLUID MECHANICS & HYDRAULIC MACHINERY**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

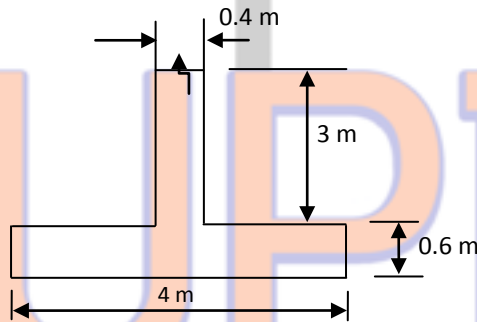
**PART – A**

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

- (a) From a flow net diagram, it was found that the distance between two consecutive streamlines at two successive sections are 10 mm and 6 mm respectively. If the velocity at the flow section is 1 m/s, find the velocity at the other section.
- (b) Calculate the total pressure on the bottom of the tank with full of water as shown below.



- (c) In a venturimeter in between convergent and divergent sections which will have more length and why?
- (d) What is equivalent pipe?
- (e) Define hydraulic efficiency of a turbine.
- (f) What is velocity of whirl and what is velocity of flow?
- (g) What is efficiency of draft tube?
- (h) List out the main parts of a centrifugal pump.
- (i) Give the purposes of a draft tube.
- (j) What are primary and secondary powers?

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 (a) A differential manometer connected at the two points A and B at the same level in a pipe containing an oil of specific gravity 0.8, shows a difference in mercury levels as 100 mm. Find the difference in pressures at the two points.
- (b) Explain the properties of viscosity and surface tension.

**OR**

- 3 (a) A stream function is given by the expression:  $\Psi = 2x^2 - y^3$ . Find components of the velocity as well as the resultant velocity at a point P(3,1).
- (b) What are laminar and turbulent flows? Also explain uniform and non-uniform flows.

**UNIT – II**

- 4 An Orifice meter consisting of 100 mm diameter orifice in a 250 mm diameter pipe has coefficient equal to 0.65. The pipe delivers oil ( $G = 0.8$ ). The pressure difference on the two sides of the orifice plate is measured by a mercury oil differential manometer. If the differential gauge reads 80 mm of mercury, find the rate of flow.

**OR**

- 5 (a) A pipe of 60 m long and 150 mm in diameter is connected to a water tank at one end and flows freely into the atmosphere at the other end. The height of water level in the tank is 2.6 m above the centre of the pipe. The pipe is horizontal and  $f = 0.01$ . Find the discharge through the pipe if all the minor losses are to be considered.
- (b) Expand and explain HGL and TEL.

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**UNIT – III**

6 Show that the maximum efficiency of a jet when it strikes a number of flat plates mounted on the periphery of a rotating wheel is 50%.

**OR**

7 Give the working proportions of Pelton wheel.

**UNIT – IV**

8 A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head is 5.6 m. If the speed ratio = 2.09, flow ratio = 0.68, overall efficiency = 86% and the diameter of the boss is 1/3 the diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine.

**OR**

9 A three stage centrifugal pump has impellers 40 cm in diameter and 2 cm wide of outlet. The vanes are curved back at the outlet at  $45^\circ$  and reduce the circumferential area by 10%. The manometric efficiency is 90% and the overall efficiency is 80%. Determine the head generated by the pump when running at 1000 rpm delivering 50 lps. What should be the shaft horse power?

**UNIT – V**

10 Explain classification of power plants.

**OR**

- 11 (a) What is flow duration curve?  
(b) Give the advantages of hydro-electric power plants.

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