

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

B.Tech-VI Semester (CSE/IT/BT/ECE/CE)

COURSE CODE (CREDITS):18B1WCE639

MAX. MARKS: 35

COURSE NAME: Open Channel Flow and Hydraulic Machine

COURSE INSTRUCTORS: Ashish Kumar

MAX. TIME: 2 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed.

Q. No	Question	CO	Marks
Q1	Why draft tube is used in reaction turbines? Briefly explain different types of draft tubes with neat sketch.	4	3
Q2	A conical draft tube has a velocity of 6 m/s at the entrance of draft tube and a velocity of 1.2 m/s at the exit. For frictional loss of 0.1 m and a tail water 5 m below the entrance of the draft tube, find the pressure head at entrance.	4	5
Q3	Explain the working principle of a Venturiflume with the help of neat sketch. How is discharge measured using a Venturiflume in open channel flow?	3	5
Q4	Explain the concept of unit quantities in turbines. A turbine is to working under a head of 25 m at 200 rpm. The discharge is 9 cumec. If the efficiency is 90%, Find unit speed; unit discharge and unit power. Also determine the performance of the turbine under a head of 20 m.	4	6
Q5	An inward flow reaction turbine has external and internal diameter as 0.9 and 0.45 m respectively. The turbine is working at 200 rpm and width of turbine at inlet is 200 mm. The velocity of flow through turbine is constant and equal to 2 m/s. The guide blade angle (α) at inlet is 10° and head at the turbine is 10 m. Assume that discharge is radial at outlet. Draw the inlet and outlet velocity triangle and find (i) The absolute velocity of water at inlet of runner (ii) The velocity of whirl at inlet (iii) The runner blade angle at inlet and outlet (iv) Discharge through the turbine (v) Power developed and hydraulic efficiency of turbine	4	8
Q6	Explain the principle of centrifugal pump. Remaining unused for several months, a centrifugal pump installed in a water supply system fails to deliver water immediately after starting. State the reason for that and how this problem can be resolved?	5	4
Q7	A centrifugal pump is to discharge $0.2 \text{ m}^3/\text{s}$ at a speed of 1450 rpm against a head of 25 m. The impeller diameter at outlet is 250 mm, its width at outlet is 50 mm and manometric efficiency is 80%. Determine the vane angle at the outer periphery of the impeller.	5	4