

Course outline

How does an NPTEL online course work?

Week 0

Week 1

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Week 11

 Lecture 43: Hydraulic turbine (Part-I)

 Lecture 44: Solved Example on Hydraulic turbine (Part-II)

 Lecture 45: Hydraulic Machines (Part-III)

 Lecture 46: Hydraulic Machines (Part-IV)

 Lecture 47: Solved Example on Hydraulic turbines (Part-V)

 Quiz: Week 11: Assignment 11

 Feedback Form for Week 11

 Week 11 : Assignment 11- Solution

Week 12

Download Videos

Week 11: Assignment 11

The due date for submitting this assignment has passed.

Due on 2021-10-13, 23:59 IST.

As per our records you have not submitted this assignment.

Please note that Question 3 and 8 can have one or more than one solution.

1) Pelton turbine is a

1 point

- 50% reaction turbine
 0% reaction turbine
 100% reaction turbine
 75% reaction turbine

No, the answer is incorrect.
Score: 0

Accepted Answers:
0% reaction turbine

2) The side thrust developed in a Pelton turbine is

1 point

- finite, but positive value.
 finite, negative value.
 zero, i.e., no thrust.
 none in the list.

No, the answer is incorrect.
Score: 0

Accepted Answers:
zero, i.e., no thrust.

3) The purpose of guide vane in Francis turbine is

1 point

- to convert a part of pressure energy into the kinetic energy.
 to regulate the flow rate through the runner.
 to guide the flow into the runner at an appropriate angle
 none in the list.

No, the answer is incorrect.
Score: 0

Accepted Answers:
to convert a part of pressure energy into the kinetic energy.
to regulate the flow rate through the runner.
to guide the flow into the runner at an appropriate angle

4) Consider the following statements pertaining to a Francis turbine:

1 point

- i. The static pressure of the water gradually decreases as it flows through the runner.
 ii. The draft tube is an integral part of the turbine.
 iii. It is a mixed flow turbine.
 iv. Specific speed determines the shape of a runner.

Which combination of the above statements is correct?

- i,ii and iii.
 i, iii and iv
 ii, iii and iv
 i, ii, iii and iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
i, ii, iii and iv

5) In a Pelton turbine, the ratio of wheel to jet diameter is recommended in between

1 point

- 7-11
 12-16
 18-22
 15-20

No, the answer is incorrect.
Score: 0

Accepted Answers:
12-16

6) Degree of reaction of a hydraulic turbine is defined as the ratio of

1 point

- the change of the static head to the total head in the rotor.
 the change of the dynamic head to the total head in the rotor.
 the total head to the change in the static head in the rotor.
 the change of the dynamic head in the stator to the dynamic head in the rotor.

No, the answer is incorrect.
Score: 0

Accepted Answers:
the change of the static head to the total head in the rotor.

7) Which of the following statement/statements is/are true for Kaplan turbine?

1 point

- i. It has a high specific speed.
 ii. It is an axial flow turbine.
 iii. It has adjustable blades.

- i and ii
 I, ii and iii
 i and iii
 ii and iii

No, the answer is incorrect.
Score: 0

Accepted Answers:
I, ii and iii

8) Which of the following turbine/turbines has/have reasonably high efficiency over a wide range of specific speeds?

1 point

- Francis turbine
 Pelton turbine
 Kaplan turbine

No, the answer is incorrect.
Score: 0

Accepted Answers:
Francis turbine
Kaplan turbine

9) Cavitation is likely to occur at the exit of a pump, whereas for turbines it occurs at the inlet.

1 point

- True
 False

No, the answer is incorrect.
Score: 0

Accepted Answers:
False

10) The phenomenon of cavitation takes place in

1 point

- reciprocating pump
 Pelton turbine
 centrifugal pump
 submersible pump

No, the answer is incorrect.
Score: 0

Accepted Answers:
centrifugal pump

11) The phenomenon of cavitation in the reaction turbines can be avoided

1 point

- by placing the turbine near the tailrace
 by reducing the exit velocity of the turbine
 By maintaining the exit pressure of the turbine above the vapour pressure
 All of these

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of these

 12) If h_1 refers the inlet to the pump, h_f is the head loss in the suction pipe, P_v is the vapour pressure at working temperature, and P_a be the atmospheric pressure, then net positive suction head (NPSH) for pump is defined as

1 point

- $\frac{P_a}{\rho g} - \frac{P_v}{\rho g} - z_1 - h_f$
 $\frac{P_a}{\rho g} - \frac{P_1}{\rho g} - z_1 - h_f$
 $\frac{P_a}{\rho g} - \frac{P_v}{\rho g} - z_1 + h_f$
 $\frac{P_a}{\rho g} - \frac{P_1}{\rho g} - z_1 + h_f$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\frac{P_a}{\rho g} - \frac{P_v}{\rho g} - z_1 - h_f$

 13) In a Francis turbine, the flow leaves the guide vane at an angle of α_1 , and it enters the runner radially, while all angles are measured with respect to the tangential direction. Assume a constant flow velocity throughout the runner. The blade efficiency is given by,

2 points

- $\eta_b = \frac{2}{2 + \cot^2 \alpha_1}$
 $\eta_b = \frac{2}{2 - \tan^2 \alpha_1}$
 $\eta_b = \frac{2}{2 + \tan^2 \alpha_1}$
 $\eta_b = \frac{1}{1 + 2 \cot^2 \alpha_1}$
 None of these

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\eta_b = \frac{2}{2 + \tan^2 \alpha_1}$

 14) A double jet Pelton turbine is installed to produce 7500kW of power under an available head at the nozzle of 400m. Assume the generator efficiency of 95.0% and the overall efficiency of 80%. Determine total flow rate passing through the turbine in m^3/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 2.2,2.8

1 point

15) Following Problem 14, calculate the diameter of the jet in mm.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 134.5,138.5

1 point

 16) A Francis turbine has a wheel diameter of 1.2 m at the entrance and 0.6 m at the exit. The blade angle at the entrance is 90° , while the guide vane angle is 15° with respect to the tangential direction. The water at the exit leaves the blades without any swirl. The available head is 30 m, and the flow velocity is assumed constant. What would be the blade angle (degree) at the exit neglecting friction?

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 27.5,29.2

2 points

17) Following problem 16, what would be the speed of the wheel in rpm?

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 267.5,269.5

2 points