

Unit 6 - Week 4:

Course outline

How to access the Portal?

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Week 4:

- Lecture 16: Axial Flow Turbine
- Lecture 17: Governing of Reaction Turbine
- Lecture 18: Introduction to Rotodynamic Pumps
- Lecture 19: Flow and Energy Transfer to Centrifugal Pumps
- Lecture 20: Tutorial - V

 Quiz : Assignment 4 Feedback for week 4

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Details Solution

Assignment 4

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-09-25, 23:59 IST.

- 1) At a hydro-electric power plant site, available head and flow rate are 24.5 m and 10.1 m³/s, respectively. If the turbine to be installed is required to run at 4.0 revolutions per second (rps) with an overall efficiency of 90%, the dimensional specific speed of the turbine is
- 205.8
 - 105.8
 - 50.8
 - 305.8

1 point

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

a

- 2) Kaplan water turbine is commonly used when the flow through its runner is
- Axial and the head available is more than 100 m
 - Axial and the head available is less than 10 m
 - Radial and the head available is more than 100 m
 - Mixed and the head available is about 50 m

1 point

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

b

- 3) Which of the following statement(s) is/are not true for the Kaplan turbine?
- Suitable where a large quantity of water at low head is available.
 - The vanes on the hub are adjustable to facilitate a shock-free entry of flow.
 - Spiral casing, guide vanes and draft tube are not required for this turbine.
 - The blade angles vary continuously from the hub to the rim.

1 point

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

c

- 4) A Kaplan turbine runner is to be designed to develop 36750 kW shaft power. The net available head is 5.50 m. The speed ratio is 2 and flow ratio is 0.69, and the overall efficiency is 86%. The diameter of the boss (or hub) is 0.35 times the outside diameter of the runner. The outside diameter of the runner is: (here speed ratio is defined as $\phi = \frac{u_1}{\sqrt{2gH}}$, where u_1 is the peripheral velocity of the runner at the hub; and Flow ratio is defined as $\psi = \frac{V_{f1}}{\sqrt{2gH}}$, where V_{f1} is the velocity of flow at the inlet and H is the head on the turbine.)

0 points

- 2.23 m
- 1.09 m
- 9.18 m
- 5.16 m

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

d

- 5) In the previous problem, the rotational speed of the runner is:

0 points

- 200.37 rpm
- 146.67 rpm
- 113.53 rpm
- 125.22 rpm

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

b

- 6) An axial flow hydraulic turbine has a net head of 23 m across it and when running at a speed of 150 rpm, it develops 23 MW power. The blade tip and hub diameters are 4.75 and 2.0 m, respectively. If the hydraulic efficiency is 93 % and the overall is 85%, the inlet and outlet blade angles at the mean radius, are respectively: (assuming axial flow at the outlet)

1 point

- $\beta_1 = 10.85^\circ$ $\beta_2 = 17.23^\circ$
- $\beta_1 = 23.85^\circ$ $\beta_2 = 17.23^\circ$
- $\beta_1 = 17.23^\circ$ $\beta_2 = 23.85^\circ$
- $\beta_1 = 23.85^\circ$ $\beta_2 = 10.85^\circ$

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

b

- 7) Regulation of discharge entering a hydraulic turbine with a view of maintaining a synchronous speed of the turbine runner is achieved automatically with the help of a mechanism known as governor. In relation to this the correct statement is:

1 point

- Deflectors and spear valves are the main components of the governor of a Pelton wheel
- Guide vanes serves as a component of governing mechanism of a reaction turbine.
- Both (a) and (b) are correct.
- Only (a) is correct.

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

c

- 8) A centrifugal pump is required to pump water to an open water tank situated 4 km away from the location of the pump through a pipe of diameter 0.2 m having Darcy's friction factor of 0.01. The average speed of water in the pipe is 2 m/s. If it is to maintain a constant head of 5 m in the tank, neglecting other minor losses, then absolute discharge pressure at the pump exit is

1 point

- 0.449 bar
- 5.503 bar
- 44.911 bar
- 55.203 bar

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

b

- 9) A centrifugal pump works under a head of 16 m of water. The external and internal diameters of the impeller are 400 mm and 200 mm respectively. The minimum speed of the pump to just start delivering water will be

1 point

- 580 rpm
- 780 rpm
- 980 rpm
- 1180 rpm

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

c

- 10) The impeller of a centrifugal pump is 0.3 m in diameter and runs at 1450 rpm. The pressure gauges on suction and delivery sides show the difference of 25 m. The impeller has backward facing blades at the outlet with a blade angle of 30°. The velocity of flow through impeller, being constant, equals to 2.5 m/s, the manometric efficiency of the pump will be

1 point

- 58%
- 68%
- 78%
- 89%

- a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

a