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Courses » Principle of Hydraulic Machines and System Design

Announcements Course Ask a Question Progress Mentor FAQ

Unit 4 - Week 2 - Radial and Axial Flow Pumps

Course outline

How to access the portal

Introductory Session

Week 1 - Principle of Operation of Hydraulic Machines

Week 2 - Radial and Axial Flow Pumps

- Velocity Triangles of Pumps, Effect of Inlet Swirl on Velocity Triangles
- Pump Casing, Efficiencies, Problems
- H-Q curve, System Resistance Curve
- Quiz : Assignment 02
- Solutions of Assignment 02

Week 3 - Radial Flow Pump

Assignment 02

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

Due on 2018-09-05, 23:59 IST.

Try all questions. Consider water as a working fluid, it not mentioned specifically.

1) The head suggested by a customer was 20 meters and the flow rate was 0.1 m^3/sec. The pipe diameter at the delivery side was 11.34 cm. The pump manufacturer delivered a pump of input power 65.4kW, efficiency 90% and flow rate of 0.5 m^3/sec. Find out whether the delivered pump will work or not, for the specifications suggested by the customer. ***1 point***

- Yes
- No

No, the answer is incorrect.
Score: 0

Accepted Answers:
Yes

2) The efficiency of the FCV is less than BCV because ***1 point***

- Blade angle of FCV is higher than BCV.
- The kinetic energy of fluid at the outlet of blade is higher for FCV than that of BCV.
- The loss in the eddy formation due to absolute velocity at the outlet of blades is higher for FCV than BCV.
- The absolute velocity at the blade outlet is higher for FCV than BCV.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Blade angle of FCV is higher than BCV.
The kinetic energy of fluid at the outlet of blade is higher for FCV than that of BCV.
The loss in the eddy formation due to absolute velocity at the outlet of blades is higher for FCV than BCV
The absolute velocity at the blade outlet is higher for FCV than BCV

- 88.16%, 88.16%
- 88.16%, 97.96%
- Insufficient data

No, the answer is incorrect.
Score: 0

Accepted Answers:
88.16%, 97.96%

4) The head developed by a centrifugal pump running at 1000 rpm is 20.4 m. If the flow velocity and blade angle at exit are 5 m/sec and 45° respectively, the impeller diameter is (consider zero swirl velocity at inlet and g=10 m/sec^2) _____ mm. ***1 point***

- 200
- 523
- 325
- Insufficient data

No, the answer is incorrect.
Score: 0

Accepted Answers:
325

5) A centrifugal pump with radial vane has the rotational speed of 1500 rpm. If the impeller outer diameter and manometric efficiency of the pump are 160 mm and 85% respectively, the net head developed by the pump is (consider zero swirl velocity at inlet and g =10 m/sec^2) _____ m. ***1 point***

- 12.0
- 13.4
- 20.5
- 18.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
13.4

6) Which of the following purposes are served by the volute casing of a centrifugal pump ***1 point***

- [ ] Directs the flow towards the delivery pipe after exit from the impeller
- [ ] Converts a part of the pressure head into velocity head
- [ ] Converts a part of the velocity head into pressure head
- [ ] Imparts additional mechanical energy to the liquid

No, the answer is incorrect.
Score: 0

Accepted Answers:
Directs the flow towards the delivery pipe after exit from the impeller
Converts a part of the velocity head into pressure head

7) In a turbine pump, the impeller is surrounded by the guide wheels consisting of a number of stationary vanes. This statement is ***1 point***

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:
True

8) For a radial flow pump which of the following cases gives higher head ***1 point***

- Pump impeller and fluid are having same direction of rotation at the inlet
- Pump impeller and fluid are having different direction of rotation at the inlet
- Purely radial inlet
- No conclusion from a, b and c

No, the answer is incorrect.
Score: 0

Accepted Answers:
Pump impeller and fluid are having different direction of rotation at the inlet

9) Let c, w and u are the absolute velocity of water, relative velocity and blade velocity respectively of a centrifugal pump. Assuming no loss of energy, the increase in piezometric head across the impeller of the pump is given by (suffix 1 is for pump inlet and suffix 2 is for pump outlet) ***1 point***

- $\frac{u_1^2-u_2^2}{2g} - \frac{w_2^2-w_1^2}{2g}$
- $\frac{u_2^2-u_1^2}{2g} - \frac{w_2^2-w_1^2}{2g}$
- $\frac{c_2^2-u_1^2}{2g} - \frac{w_1^2-w_2^2}{2g}$
- $\frac{2u_2^2-u_1^2}{2g} - \frac{w_2^2-w_1^2}{2g}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{u_2^2-u_1^2}{2g} - \frac{w_2^2-w_1^2}{2g}$

10) For a radial flow pump, if the flow is swirl free at the inlet then head developed by the pump will ***1 point***

- Increases with the increase in blade velocity at the inlet
- Decreases with the increase in blade velocity at the inlet
- Independent of the blade velocity at the inlet
- None

No, the answer is incorrect.
Score: 0

Accepted Answers:
Independent of the blade velocity at the inlet

Previous Page End