Unit 5 - Week 3:

Assignment 3

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

Due on 2019-09-18, 23:59 IST.

1) Cavitation damage in a reaction turbine runner occurs — *1 point*

(a) Near the inlet on the concave side of the blades
(b) Near the outlet on the convex side of the blades
(c) Near the inlet on the convex side of the blades
(d) Near the outlet on the concave side of the blades

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
b

2) The function of the draft tube in a reaction turbine is — *0 points*

(a) to enable the shaft of the turbine to be vertical
(b) to transform a large part of pressure energy at turbine outlet into kinetic energy
(c) to avoid whirl losses at the exit of the turbine
(d) to transform a large part of the kinetic energy at the runner outlet into atmospheric pressure energy by creating a vacuum pressure at the runner outlet.

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
d

3) Consider the following statements regarding the functions of the guide vanes (or wicket gate) in reaction turbine — *1 point*

(i) It converts a part of the pressure energy of the fluid at its entrance to the kinetic energy.
(ii) It directs the fluid on the runner blades at the angle appropriate to the design.
(iii) It converts a part of the kinetic energy of the fluid rejected at the runner outlet into useful pressure.

Out of the above statements
(a) Only (i) and (ii) are correct
(b) Only (i), (ii) are (iii) are correct
(c) Only (i) and (iii) are correct
(d) Only (ii) is correct

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
a

4) Hydraulic turbines are classified as impulse and reaction depending on the manner in which the flow strikes the vanes. Match the statements in the right with the appropriate category in the left: — *1 point*

A. Impulse Turbine	(i) All the available energy is converted into kinetic energy at the inlet to the rotor blades
B. Reaction turbine	(ii) Pressure and velocity both changes as flow passes through the turbine
	(iii) Pressure throughout remains atmospheric and the velocity alone changes in the rotor
	(iv) Water is admitted over the entire circumference of the runner
	(v) Water is admitted only in the form of jets
	(vi) Turbine is connected to the tail race through draft tube

The options are:

(a) A-(i),(iii),(v); B- (ii),(iv),(vi)
(b) A-(ii),(iii),(iv); B- (i),(v),(vi)
(c) A-(i),(ii),(iii); B- (iv),(v),(vi)
(d) None of the above.

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
a

5) For an inward flow reaction turbine, the blade angler at inlet is 90^0 and velocity of flow is constant. The discharge from the runner wheel is radial. The hydraulic efficiency is obtained as — *1 point*

(a) $\frac{2}{1+\tan^2(\alpha)}$
(b) $\frac{1}{1+\tan^2(\alpha)}$
(c) $\frac{2}{2+\tan^2(\alpha)}$
(d) $\frac{2}{1+2\tan^2(\alpha)}$

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
c

6) The inlet angle of runner blades of a Francis turbine is 90^0. The blades are so shaped that the tangential component of velocity at blade outlet is zero. The flow velocity remains constant throughout the blade passage and is equal to half of the blade velocity at runner inlet. The blade efficiency of the runner is — *0 points*

(a) 25%
(b) 50%
(c) 80%
(d) 89%

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
c

7) In the velocity triangles at the inlet and exit of the rotor of a turbomachine, V denotes the absolute velocity of the fluid, W denotes the relative velocity of the fluid and U denotes the blade velocity. Subscripts 1 and 2 refer to inlet and outlet respectively. If $W_2 = V_1$ and $W_1 = V_2$, U_1 and $U_2 = U$, then the degree of reaction is — *1 point*

(a) 0
(b) 1
(c) 0.5
(d) 0.25

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
c

8) The diameter of the runner of a vertical-shaft turbine is 450 mm at the inlet. The width of the runner at the inlet is 50 mm. The diameter and width at the outlet are 300 mm and 75 mm, respectively. The blades occupy 8% of the circumference. The guide vane angle is 24^0, the inlet angle of the runner blade is 95^0 and the outlet angle is 30^0. The fluid leaves the runner without any whirl. The pressure head at the inlet is 55 m above the exit from the runner. The fluid friction losses account for 18% of the pressure head difference between the inlet and outlet. The absolute velocity of water at the inlet is (use mechanical efficiency as 95%): — *1 point*

(a) 20.62 m/s
(b) 56.32 m/s
(c) 85.23 m/s
(d) 28.62 m/s

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
d

9) In the previous problem the rotational speed of the runner is: — *1 point*

(a) 10.56 rev/s
(b) 21.26 rev/s
(c) 15 rev/s
(d) 105.26 rev/s

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
b

10) The head available to both the Francis turbines A and B is 80 m. The mean atmospheric pressure is 101.043 kPa and the vapour pressure for water is 2.943 kPa. The height of the runner of turbine A above the tail water level is 0.2 m and for turbine B is 0.6 m. If the critical cavitation factor is 0.1144, then which one of the following statements is correct? — *1 point*

(a) Cavitation does not occur in any of these turbines
(b) Cavitation occurs in both the turbines
(c) Cavitation occurs only in turbine A
(d) Cavitation occurs only in turbine B

a
b
c
d

No, the answer is incorrect.
Score: 0
Accepted Answers:
a