

Unit 3 - Week 1:

Course outline
How to access the Portal?
Week 0 : Assignment 0
Week 1:
<ul style="list-style-type: none"> Lecture 1: Definition of Fluid Machines and Energy Transfer in Fluid Machine Part - I Lecture 2: Definition of Fluid Machines and Energy Transfer in Fluid Machine Part - II Lecture 3: Impulse and Reaction Machines: Introductory Concepts Lecture 4: Principles of Similarity in Fluid Machines Lecture 5 : Concept of Specific Speed
<input type="radio"/> Quiz : Assignment 1 <input type="radio"/> Feedback for week 1
Week 2:
Week 3:
Week 4:
Week 5:
Week 6:
Week 7:
Week 8:
Details Solution

Assignment 1

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

Due on 2019-09-11, 23:59 IST.

- 1) Which among the following statements is/are correct regarding the definition of fluid machines? 1 point
- (a) A device where the kinetic, potential or intermolecular energy held by the fluid is converted to mechanical energy by a rotating member is known as a turbine.
- (b) The machines where the mechanical energy from moving parts is transferred to a fluid to increase its stored energy by increasing either its pressure or velocity are known as pumps, compressors, fans or blowers.
- (c) Option (a) is correct but (b) is wrong.
- (d) Both (a) and (b) are correct.
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 d
- 2) Fluid machines use either liquid or gas as the working fluid depending upon the purpose. In this context, the various fluid machines are distinguished as 1 point
- (a) A machine transferring mechanical energy of the rotor to the energy of the fluid is termed as pump, when it uses liquid.
- (b) A machine transferring mechanical energy of the rotor to the energy of the fluid is termed as a turbine, when it uses gas.
- (c) A blower is a machine where the main objective is to increase the static pressure of the gas. Therefore the mechanical energy held by the fluid is mainly in the form of pressure energy.
- (d) Turbines can only handle liquid water and not suitable for steam or gas.
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 a
- 3) Consider the following statements pertaining to the classification of fluid machines: 1 point
- (i) Rotodynamic machines are those whose functioning depends on the principle of fluid dynamics
- (ii) Rotodynamic machines are those whose functioning depends on the change of volume of a certain amount of fluid within the machine
- (iii) Positive displacement machines are those whose functioning depends on the principle of fluid dynamics
- (iv) Positive displacement machines are those whose functioning depends on the change of volume of a certain amount of fluid within the machine.
- Now choose the correct option from below
- (a) Only statement (i) is correct
- (b) Statements (i) and (ii) are correct.
- (c) Statements (ii) and (iv) are correct.
- (d) Statements (i) and (iv) are correct.
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 d
- 4) The force exerted by a jet on the vane is determined by application of the momentum principle. If M_{in} and M_{out} are the momentum per second entering and leaving a control volume in a given direction, the force exerted by a jet on the vane in the same direction is 1 point
- (a) $M_{in} - M_{out}$
- (b) $M_{out} - M_{in}$
- (c) $M_{in} + M_{out}$
- (d) $M_{in} \cdot M_{out}$
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 a
- 5) When a fluid jet strikes a curved vane, the velocity triangles represent the flow conditions at the entrance and the exit. The force on the vane in the direction of its motion is 1 point
- (a) $\frac{W}{g}(w_1 - w_2)$
- (b) $\frac{W}{g}(V_{f1} - V_{f2})$
- (c) $\frac{W}{g}(V_{w1} - V_{w2})$
- (d) $\frac{W}{g}(V_{w1} - V_{w2})u$
- Here W is the weight of the fluid striking the vane per second, and w, V_f and V_w are velocity of the fluid relative to the vane, velocity of flow and the velocity of whirl respectively. Suffix 1 and 2 represent inlet and outlet points of the vane.
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 c
- 6) Euler equation for water turbine is derived on the basis of 1 point
- (a) Rate of change of velocity
- (b) Conservation of mass
- (c) Rate of change of linear momentum
- (d) Rate of change of angular momentum
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 d
- 7) According to Euler's equation in relation to hydraulic machines, the rate of energy transfer by the fluid to the rotor for unit mass flow rate can be expressed: (where V_r, U and V_w are the relative velocity of fluid with respect to the rotor, linear velocity of the rotor and the whirl component of fluid velocity, respectively; and subscripts 1 and 2 represent inlet and outlet of the rotor, respectively.) 1 point
- (a) $V_{w1}U_2 - V_{w2}U_1$
- (b) $V_{w2}U_2 - V_{w1}U_1$
- (c) $V_{w2}U_2 + V_{w1}U_1$
- (d) $V_{w1}U_1 - V_{w2}U_2$
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 d
- 8) Consider the following statements 1 point
- (i) In radial flow pumps or compressors the flow is always directed radially outward, while in a radial flow turbine it is directed radially inward.
- (ii) For axial flow machines the corresponding inlet and outlet points of the flow do not vary in their radial locations from the axis of rotation.
- (iii) The change in the static head in the rotor of an axial flow machine is only due to the flow of fluid through the variable area passage in the rotor.
- (iv) For radially outward flow machines, $U_2 < U_1$; hence the fluid gains in static head, while for a radially inward flow machine, $U_2 > U_1$, and the fluid loses its static head.
- (where V_r, U and V_w are the relative velocity of fluid with respect to the rotor, linear velocity of the rotor and the whirl component of fluid velocity, respectively; and subscripts 1 and 2 represent inlet and outlet of the rotor, respectively.) Choose the correct option below:
- (a) (i) is correct and (iv) is the correct reason.
- (b) (iii) is correct and (ii) is the correct explanation.
- (c) Both (i) and (iv) are wrong.
- (d) (iii) is correct but (ii) is not the correct explanation.
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 b
- 9) The hydraulic efficiency of a turbine is defined as 1 point
- (a) The ratio of mechanical energy delivered by the rotor to that available from the fluid.
- (b) The ratio of mechanical energy in output shaft at coupling to that available from the fluid.
- (c) The ratio of mechanical energy available from the fluid to that available in output shaft at coupling.
- (d) The ratio of mechanical energy available from the fluid to that delivered by the rotor.
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 a
- 10) A hydraulic turbine develops 1000 kW power for a head of 40m. If the head is reduced to 20m, the power developed (in kW) is 1 point
- (a) 177 to 178
- (b) 353 to 354
- (c) 500 to 501
- (d) 707 to 708
- a
 b
 c
 d
- No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 b