

Day: Friday
Date: 16/11/2018

W-2018-2360

Time: 02.30 PM TO 05.30 PM
Max. Marks: 60

N.B.

- 1) All questions are **COMPULSORY**.
 - 2) Figures to right indicate **FULL** marks.
 - 3) Assume suitable data if necessary.
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Q.1 Derive an expression for with jet striking at the center of the vane and jet striking tangentially on to the vane. (10)

OR

Q.1 A jet of water having a velocity of 20m/s strikes a curved vane which is moving with a velocity of 10m/s. The jet makes an angle of 20^0 with the directions of motion of vane at inlet and leaves at an angle of 130^0 to the direction of motion of vane at outlet calculate
a) Vane angles, so that the water enters and leaves the vane without shock.
b) Work done per second per unit weight of water striking. (10)

Q.2 Explain construction and working of Kaplan turbines with neat sketch. Also explain selection of turbines in detail. (10)

OR

Q.2 As in ward flow reaction turbine has external and internal diameters as 1.0 m and 0.6 m respectively. The hydraulic efficiency of the turbine is 90% when the head on the turbine is 36m. The velocity of flow at outlet is 2.5 m/s and discharge at outlet is radial. If the vane angle at outlet is 15^0 and with of the wheel is 100 mm at inlet and outlet. Determine a) The guide blade angle b) speed of the turbine c) the vane angle of the runner at inlet (10)

Q.3 Derive the expression of equation for velocity and mass flow rate for steam nozzles. Also explain types of steam nozzles. (10)

OR

Q.3 Give detailed classification of steam turbines. Explain velocity diagrams and analysis of Impale and reaction turbines. (10)

Q.4 Derive an expression for minimum speed for starting a centrifugal pump. The diameters of an impeller of a centrifugal pump at inlet and outlet are 30 c.m. and 60 c.m. respectively. Determine the minimum starting speed of the pump if it works against head of 30m. (10)

OR

Q.4 Obtain an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water. Also explain what is priming ? why is it necessary? (10)

Q.5 Explain the classification of rotary compressor. Explain surging, choking, and stalling characteristics. Explain slip factor in detail. (10)

OR

Q.5 Explain construction and working of centrifugal compressor with neat sketch. Also explain flow process on T-S diagram. (10)

Q.6 Explain stage velocity triangles and its analysis, for axial compressor. Also discuss stage losses and efficiencies. (10)

OR

Q.6 A 50%reaction, axial flow compressor runs at a mean blade speed of 250 m/s. The pressure ratio developed by the machine is 1.3 . Determine the blade and air angle if the mean flow velocity was 200 m/s .Condition at inlet are 1 bar and 300k. (10)