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B.Tech. 5th Semester Mechanical Engg.-VII

Examination December-2013

FLUID MACHINES

Paper-ME-305-F

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt any five questions from eight questions.*

1. A Francis turbine with an overall efficiency of 76% is required to produce 150 kW. It is working under a head of 8m. The peripheral velocity equal to  $0.25 \sqrt{gH}$  and the radial velocity of flow at inlet is  $0.95 \sqrt{gH}$ . The wheel runs at 150 rpm and hydraulic losses in turbine are 20% of available energy (assuming radial discharge), determine
  - (i) Guide blade angle
  - (ii) Diameter of wheel at inlet
  - (iii) Wheel vane angle at inlet
  - (iv) Width of wheel at inlet ? 20
  
2. Discuss Cavitation and its causes; also explain its harmful effects of methods to prevent ? 20
  
3. A jet of water moving at 12 m/s and impinges on a concave shaped when to deflect the jet through 120 degree when stationary, the vane is moving at 5 m/s then find :

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- (i) Angle of the jet so that there is no shock at inlet
  - (ii) The absolute velocity of jet at exit both in magnitude and direction
  - (iii) Work done. 20
4. Describe the Impulse turbine with neat sketch also explain speed ratio, flow ratio, Jet ratio and no. of buckets. 20
5. (a) Explain the governing of propeller turbine and also write its characteristics. 10
- (b) What is the function of draft tube and also sketch its diagram ? 10
6. (a) Explain the Performance characteristics of Kaplan turbine. 10
- (b) Explain 'priming' in detail for reciprocating pump. 10
7. A single jet impulse turbine at 200 rpm under a head of 500 m. The jet diameter 200 mm, its deflection inside the bucket is 150 degree and its relative velocity is reduced by 15% due to friction. Determine :
- (i) Water power
  - (ii) Overall force on bucket
  - (iii) Overall efficiency. 20

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8. Write short notes on :

(a) Degree of reaction in turbine

(b) Impulse momentum principle

(c) Hydraulic crane

(d) Specific speed of centrifugal pump

20