B. TECH.
THEORY EXAMINATION (SEM–VI) 2016-17
FLUID MACHINERY

Time : 3 Hours   *Max. Marks : 100*

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION – A

1. **Attempt all parts of the following questions:**   10 x 2 = 20
    (a) State and explain continuity equation of steady flow for incompressible fluids.
    (b) Define degree of reaction.
    (c) State the impulse momentum principle.
    (d) What is the function of the nozzle in an impulse turbine?
    (e) What do you mean by radial flow turbine?
    (f) Define unit sped.
    (g) What are the advantages of model testing?
    (h) Define manometric efficiency.
    (i) What is the cause of acceleration head?
    (j) What is a hydraulic intensifier?

SECTION – B

2. **Attempt any five of the following questions:**   5 x 10 = 50
    (a) Draw the neat sketch and explain the working of a simple accumulator.
    (b) Derive an expression for accelerating head in reciprocating pump assuming piston motion by S.H.M.
    (c) A centrifugal pump delivers 1.27 m3 of water per minute at 1200 r.p.m. The impeller diameter is 350 mm and breadth at outlet 12.7 mm. The pressure difference between inlet and outlet of pump casing is 272 kN/m^2 . Assuming manometric efficiency at 63%, calculate the impeller exit blade angle.
    (d) Discuss performance characteristics of a hydraulic turbine.
    (e) Prove that a draft tube prevents for the loss of head of reaction turbine.
    (f) Explain the Governing of a Pelton Turbine. Use neat sketch.
    (g) A jet of water of diameter 50 mm having a velocity of 20 m/s strikes at inlet of a curved vane which is moving with a velocity of 10 m/s in the direction of the jet. The jet leaves the vane at an angle of 60o to the direction of motion of vane at outlet. Determine the force exerted by the jet on the vane in the direction of motion and work done per second by the jet.
    (h) Discuss the classification of hydraulic turbines.

SECTION – C

Attempt any two of the following questions: 2 x 15 = 30

3   Explain with neat sketch the working of a hydraulic ram. Also, explain the various efficiencies applicable to hydraulic ram. State its advantages and limitations.

4   A single acting reciprocating pump running at 60 r.p.m. has its piston area of 80 cm^2 and stroke length 150 mm. The area of suction pipe is 60 cm2. The suction head is 3 m. assuming a friction factor of 0.04, find the pressure head on the piston at the beginning, middle and at the end of the suction stroke if the length of suction pipe is 6 m. Assume motion of piston as S.H.M. Can cavitation take place if the working liquid is

water?

5   A centrifugal pump running at 700 r.p.m. is supplying 9m3/min of water against a head of 19.6 m. The blade angle at the blade exit is 135o with the direction of motion of the blade tip. Assume the entry of water at the inlet of vane is radial. The velocity of flow at inlet and outlet is constant at 1.8 m/s. Determine the necessary diameter and width of the impeller at exit allowing 8% for vanes thickness and 40% of energy corresponding to the velocity at exit from the impeller is recovered.