Exam.Code:0941
Sub. Code: 7057

1128

B. E. (Mechanical Engineering)
Fifth Semester
MEC-506: Fluid Machinery

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

a) Condition for maximum efficiency for series of vanes is given by_____ and Max efficiency is _____.

b) What is use of breaking jet in Pelton turbine?

c) What is difference between Inward flow and outward flow turbine?

d) Francis turbine is an _____ turbine having discharge _____ at outlet.

e) What is significance of specific speed?

f) What is Priming in Centrifugal pump.

g) What is Mach number?

h) What is Indicator diagram for a Reciprocating pump?

i) What is capacity of hydraulic accumulator?

j) What are Muschel curves? (10x1)

UNIT – I

II. a) Sketch a Hydropower plant and describe its elements.

b) A jet of water having a velocity of 30 m/s, strikes a series of radial curved vanes mounted on a wheel which is rotating at 300 r.p.m. The jet makes an angle of 30° with the tangent to wheel at inlet and leaves the wheel with a velocity of 4 m/s at an angle of 120° to the tangent to the wheel at outlet. Water is flowing from outward in radial direction. The outer and inner radii of the wheel are 0.6 m and 0.3 m respectively. Determine: (ii) vane angles at inlet & outlet, (ii) work done per second per kg of water, and (iii) efficiency of the wheel. (2,8)

III. a) A pelton wheel is to be designed for the following specifications. Power = 735.75 kW shaft power, Head = 200 m, speed = 800 r.p.m., overall efficiency = 0.86 and jet diameter is not to exceed one-tenth the wheel diameter. Determine: (i) Wheel diameter, (ii) the number of jets required, (iii) Diameter of the jet. Take C_v= 0.98, speed ratio = 0.45.

b) What are unit quantities for a turbine? Why are they important? (8,2)

P.T.O.

IV. a) What is governing of turbine. Explain the working of an oil pressure governor with a neat sketch

b) An inward flow reaction turbine has external and internal diameters as 1.2 m and 0.6 m respectively. The velocity of flow through the runner is constant and is equal to 1.8 m/s. Determine: (i) Discharge through the runner, and (ii) width at outlet if the width at inlet is 200 mm. (4,6)

UNIT – II

V. a) Differentiate between the volute and vortex casing for centrifugal pump.

b) The diameters of an impeller of a centrifugal pump at inlet and outlet are 30 cm and 60 cm respectively. The velocity of flow at outlet is 2.0 m/s and the vanes are set back at an angle of 45 at the outlet. Determine the minimum starting speed of the pump if the manometric efficiency is 70%. (3,7)

VI. a) What is an air vessel? What are its functions?

b) Draw indicator diagram, considering the effect of acceleration and friction in suction and delivery pipes of reciprocating pumps. Find an expression for work done per second in case of single acting reciprocating pump. (2,8)

VII. a) The resistance R, to the motion of a completely, submerged body depends upon the length of the body L, velocity of flow V, mass density of fluid p and Kinematic viscosity v. Derive an expression for resistance R using Buckingham's n theorem.

b) How does a torque converter differ from a fluid coupling? Explain the working principle of any one of them with neat sketch. (5,5)

X-X-X