

B. Tech. 5th Semester (F) Scheme (ME)

Examination, December-2018

FLUID MACHINE

Paper-ME-305-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt any five questions in all. Question No. 1 is compulsory and attempt at least one question from each section.

Section-A

1. Explain the following :
 - (a) Net positive suction head
 - (b) Difference between volute casing and spinal casing
 - (c) Hydraulic Intensifier
 - (d) Design of buckets of Pelton Wheel 4×5=20

Section-B

2. A stationary vane having an inlet angle of zero degree and an outlet angle 25° receives water at a velocity of 50 m/s. Determine the components of force acting on it in the direction of jet velocity and normal to it. Also find the resultant force in magnitude and direction. Assume water flow 1kg/s. 20

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3. At a particular hydro electric power plant, water available under a head of 250 m is delivered to the power house through three pipes each 2500m long. Through these pipes friction loss is estimated to be 20m. The project is required to produce a total shaft output of 13.25 MW by installing a number of single jet pelton wheels whose specific speed is not to exceed 38.5. The other data required is :

Wheel speed = 650 rpm

Ratio of bucket to jet speed = 0.46

Overall efficiency of wheel = 85%

For nozzle $C_d = 0.94$ and $K_v = 0.97$

Friction coefficient $f = 0.005$. Determine jet diameter and diameter of supply pipes. 20

Section-C

4. Explain the component parts, construction and operation of Modern Francis turbine with detailed sketches. 20
5. (a) Explain the differences between Francis turbine and Propeller turbine. 10
- (b) Discuss in detail the design of draft tube and its application. 10

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Section-D

6. What are the various methods of dimensional analysis to obtain a functional relationship between various parameters affecting a physical phenomenon ? Describe with an illustration. 20
7. Explain component parts, construction and operation of a centrifugal pump. Also discuss classification of centrifugal pumps. 20

Section-E

8. Explain the term negative slip as used in connection with the working of a reciprocating pump. Why and when negative slip occurs ?
- A double acting reciprocating pump, having cylinder-diameter of 14cm and stroke 30 cm, is used to raise water through a height of 30 meters. If the pump is working at 30 rpm and the pump efficiency is 75%. What is the power required to drive the pump ? Neglect the effect of piston rod area. 20
9. Explain the following :
- (a) Hydraulic accumulator
- (b) Hydraulic intensifier
- (c) Fluid coupling
- (d) Torque converter. 4×5=20

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