Roll No. ....

OLE-24259

B. Tech. 5th Semester (ME)
Examination – April, 2021
FLUID MACHINE
Paper : ME-305-F

Time : Three Hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. **1** is **compulsory**. Attempt any **five** questions by selecting at least any **one** question form each Section.

1. Explain the following : $2 \times 10 = 20$
   - (a) Differentiate between turbines and pumps.
   - (b) Define gross head and net head of pelton turbine.
   - (c) Differentiate between radial and axial flow turbines.
   - (d) Classify different types of pumps.
   - (e) Net positive suction head
   - (f) Difference between volute casing and spinal casing.
   - (g) Hydraulic Intensifier

(h) Design of buckets of pelton wheel

(i) Governing of turbines

(j) Specific speed

SECTION – A

2. In a particular hydro electric power plant, water available under a head of 250m is delivered to the power house through three pipes each 50 m 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 :   20

Wheel speed = 650 rpm

Ratio of bucket to jet speed = 0.46

Overall efficiency of wheel= 80%

For nozzle Cd = 0.94 and Kv = 0.97

Friction Co-efficient f= 0.005. Determine jet diameter and diameter of supply pipes.

3. (a) Obtain an expression for unit speed, unit discharge and unit power for a turbine.   10

(b) Describe briefly the function of various main components of pelton turbine with neat sketches.   10

SECTION – B

4. Explain construction, working principal and design parameters of Francis turbine with neat and clean diagram.

5. (a) A Kaplan turbine working under a head of 25 m develops 16000 KW shaft power. The outer diameter of runner is 4m and hub diameter is 2m. the guide blade angle is 35°. The hydraulic and overall efficiencies are 85% and 80% respectively, if velocity of whirl is zero at inlet. **12**

(b) What is draft tube ? Why is it used in a recation turbine ? Describe with sketches two different types of draft tubes. **8**

SECTION – C

6. (a) Describe Rayleigh's method for dimensional analysis. **12**

(b) Define Reynold's number, Froude's number and Mach's number. What are their significances for fluid flow problems ? **8**

7. Explain components parts, construction and operation of a centrifugal pump. Also discuss classification of centrifugal pumps. **20**

SECTION – D

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 30cm, is used to raise water through a height of 30 m. if the pump is working at 30rpm and the pump efficiency is 80%, what is the power-required to drive the pump ? Neglect the effect of pistion rod area. **20**

9. Explain the following :   20

    (a) Hydraulic Accumulator

    (b) Hydraulic Intensifier

    (c) Torque Converter

    (d) Fluid Coupling

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