Exam.Code:0941
Sub. Code: 33867

2124

**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 (section-A) which is compulsory and selecting two questions each from Section B-C.***

*x-x-x*

**Section – A (2 marks each)**

1.
a) Differentiate between an Impulse Turbine and a Reaction Turbine
b) State any two functions of Draft Tube.
c) Distinguish between the terms "Sound" and "Noise"
d) What is the function of a Hydraulic Accumulator.
e) What is the use of air vessels in pumps

**Section – B (10 marks)**

2. A Pelton wheel is required to develop **9193.7** kW at the shaft when working under a head of **300 m**. Assuming the values of $C_v$ as **0.98**, $K_u$ (speed ratio) as **0.45,** and **m** (=D/d) as **12**, determine (i) The number of jets, (ii) The diameter of the wheel, (iii) The quantity of water required, and (iv) The diameter of the jet. Take the speed of the wheel as **550 r.p.m.** and overall efficiency as **85%**.

3. The following data is given for a Francis Turbine:
   a) Net Head H = **60 m**
   b) Speed N = **700 r.p.m.**
   c) Shaft power = **294.3 kW**
   d) Overall efficiency = **84 %**
   e) Hydraulic efficiency = **93 %**
   f) Flow ratio = **0.2**
   g) Breadth ratio $n$ = **0.1**

   The Outer diameter of the runner = **2 X** inner diameter of runner. The thickness of the vane occupies **5 %** of the circumferential area of the runner, and the velocity of flow is constant at the inlet and outlet. The discharge is radial at the outlet. Determine: (i) Guide Blade Angle (ii) Runner Vane Angle at inlet and outlet (iii) Diameters of the runner at inlet and outlet and (iv) Width of the wheel at inlet.

4. a) Write a short note on: Indoor Propagation and Outdoor Propagation of sound.
   b) Outline the reasons for using the Cordier diagram for the selection of various turbo-machinery equipment. Also, list down the various regions of the Cordier diagram with their specific speed and specific diameter ranges. Also, draw the Cordier diagram. **(4,6)**

**P.T.O.**

Section – C (10 marks)

5. a) Define the "Buckingham theorem".

   b) Discuss the Performance Characteristics of Hydraulic Turbines with the help of suitable diagrams. (2, 8)

6. a) It is required to deliver **0.048 $m^3/s$** of water to a height of **24 m** through a **150 mm** diameter pipe and **120 m** long, by a centrifugal pump. If the overall efficiency of the pump is **75 percent** and the coefficient of friction, **f = 0.01** for the pipeline, find the power required to drive the pump.

   b) List down the operational difficulties commonly experienced in centrifugal pumps and their remedies. (6,4)

7. a) Explain the construction and working of the Fluid Coupling and Torque Converter with the help of a neat and clean diagram.

   b) Explain in detail the Hydraulic Ram with the help of a diagram. (6, 4)

*x-x-x*