Exam.Code:0941
Sub. Code: 6726

2074
B. E. (Mechanical Engineering)
Fifth Semester
MEC-506: Fluid Machinery

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

NOTE: Attempt <u>five</u> questions in all, including Question No. 1 (Section-I) which is compulsory and selecting two questions each from Section B- C.

x-x-x

Section – A

1.

a) Differentiate between Inward and outward radial flow turbine.

b) What is a Surge Tank? What is its location in the fluid power plant.

c) Why are centrifugal pumps used sometimes in series and sometimes in parallel.

d) What are the various functions of the Air Vessels.

e) Define slip, percentage slip and negative slip of a reciprocating pump. (5×2)

Section – B

2. The given data relate to a Pelton wheel, Head: **72 m**; Speed of the wheel: **240 r.p.m.**; Shaft power of the wheel: **115 kW**; Speed ratio: **0·45**; Co-efficient of velocity: **0·98**; Overall efficiency: **85%.** Design the Pelton wheel, find diameter of the wheel, diameter of jet, width & depth of buckets and number of buckets on the wheel. (10)

3. Discuss in general the main and operating characteristics of a hydraulic turbine with help of a diagram. Which of the Pelton, Francis and Propeller turbine gives better off-design performance and why? How can the off-design performance be improved of other machines. (10)

4. Write a short note on the following :

(a) Pump Noise, Compressor and Turbine Noise.

(b) Selection of Variable Pitch and Variable Inlet Vane Fans. **(5,5)**

Section – C

5. a) What does an Indicator diagram represents. Draw the diagram also

b) The piston of a double acting reciprocating pump has a diameter of **100 mm** and a stroke of **250 mm**. The pump has a vertical suction pipe **5 m** long and its diameter is **100 mm**. The pump runs at **90** double strokes per minute and the motion is considered to be simple harmonic. Calculate the maximum permissible suction lift assuming that separation occurs at **2 m** of water absolute. Take atmospheric head as **10.2 m** of water. How this value would change if crank-connecting rod ratio is **1/7.5** and the piston motion is not considered to be simple harmonic. **(2, 8)**

P.T.O.

6. A centrifugal pump impeller having external and internal diameters **480 mm** and **240 mm** respectively is running at **1000 r.p.m.** The rate of flow through the pump is **0.0567 m^3/s** & velocity of flow is constant and equal to **2.4 m/s**. The diameters of the suction & delivery pipes are **180 mm** and **120 mm** respectively. The suction and delivery heads are **6.2 m** (abs.) and **30.2 m** (abs.) of water respectively. If the power required to drive the pump is **23.3 kW** and the outlet vane angle is **45°**, determine: (i) Inlet vane angle, (ii) The overall efficiency of the pump, and (iii) The manometric efficiency of the pump. (10)

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

   b) Discuss the salient features of Air Lift Pump in brief. (7, 3)

x-x-x