

**B. E. (Mechanical Engineering)**  
**5<sup>th</sup> Semester, Minor-II**  
**Fluid Machinery (MEC506)**  
**Nov. 2022**

Time allowed: 90Min.

Max. Marks: 30

- Q. 1** The impeller of a centrifugal pump has an outer diameter of 250mm and an effective area of  $0.017\text{m}^2$ . The blades are bent backwards so that the direction of outlet relative velocity makes an angle of  $148^\circ$  with the tangent drawn in the direction of impeller rotation, the diameters of suction and delivery pipes are 150mm and 100mm respectively. The pump delivers  $0.031\text{m}^3/\text{s}$  at 1450rpm when the gauge points on the suction and delivery pipes close to the pump show heads of 4.6m below and 18.0m above atmosphere respectively. The head losses in the suction and delivery pipes are 2.0m and 2.9m respectively. The motor driving the pump delivers 8.67kW. Assuming that water enters the pump without shock and whirl, **draw velocity triangles and determine:** the manometric efficiency and overall efficiency of the pump. (08)
- Q. 2** A centrifugal pump is discharging  $0.025\text{m}^3/\text{s}$  of water against a total head of 18m. The diameter of impeller is 0.4m and it is rotating at 1400rpm. Calculate the head, discharge and ratio of powers of a geometrically similar pump of diameter 0.25m when it is running at 2800rpm. (04)
- Q. 3** A single-acting reciprocating pump is to raise a liquid of density  $1200\text{kg}/\text{m}^3$  through a vertical height of 11.5m, from 2.5m below pump axis to 9m above of it. The plunger moves with SHM, has diameter 125mm and stroke 225mm. The suction and delivery pipes are of 75mm diameter and 3.5m; and 13.5m long respectively. There is a long vessel placed on the delivery pipe near the pump axis but there is no air vessel on the suction pipe. If separation takes place 0.88bar below atmospheric pressure **find:** Maximum speed with which the pump can run without separation taking place and power required to drive the pump, if  $f=0.02$ . Neglect the slip for the pump. (08)
- Q. 4** Write Short note on: Air lift pump, Hydraulic ram, and Hydraulic intensifier. (06)
- Q. 5** What do you understand by Priming of a pump. Discuss the method of priming. (04)