



**Module-3**

- 5 a. Define Dimensional homogeneity. (02 Marks)  
 b. The frictional torque  $T$  of a disc of diameter  $D$ , rotating at a speed  $N$  in a fluid of viscosity  $\mu$ , and density  $\rho$ , in a turbulent flow is given by  $T = D^5 N^2 \rho \phi \left[ \frac{\mu}{D^2 N \rho} \right]$  prove this by Buckingham's  $\pi$  theorem. (08 Marks)  
 c. With mathematical formula define the following dimensionless Number  
 i) Reynolds number ii) Froude number iii) Euler's number  
 iv) Weber's number v) Mach's number. (10 Marks)

**OR**

- 6 a. Derive an Expression for venturimeter discharge equation with assumption made. (10 Marks)  
 b. Derive an expression for the V notch discharge equation. (08 Marks)  
 c. Write short note on pitot tube. (02 Marks)

**Module-4**

- 7 a. Define turbo machine. With neat diagram, explain parts of turbo machine. (08 Marks)  
 b. Write difference between Turbo machine and positive displacement machine. (08 Marks)  
 c. Classify the turbo machine. (04 Marks)

**OR**

- 8 a. Derive an expression for Euler turbine Equation. (10 Marks)  
 b. Derive an expression for Alternative form of Euler Equation. (10 Marks)

**Module-5**

- 9 a. Derive an expression for Maximum blade efficiency of Pelton turbine. (10 Marks)  
 b. With a neat sketch, explain working of Kaplan turbine. (07 Marks)  
 c. Write the function of Draft tube. (03 Marks)

**OR**

- 10 a. Define Compounding? Explain pressure compounding with pressure velocity diagram. (07 Marks)  
 b. Derive an Expression for Maximum blade efficiency of single stage impulse turbine. (10 Marks)  
 c. Define the following :  
 i) Blade efficiency ( $\eta_{blade}$ )  
 ii) Axial thrust ( $F_a$ ) (03 Marks)

\* \* \* \* \*