JC Bose University of Science & Technology YMCA, Faridabad
B. Tech 3rd Semester Mechanical Engineering
Thermodynamics (PCC-ME-301/21)
1st Sessional Test, October 2024

Max. Marks: 15   **Time Allowed: 90 minutes**

Note: Attempt all questions.

Q. No.	Statement	Marks	CO
Q1(a)	In a new temperature scale say ^oP, the boiling and freezing points of water at one atmosphere are 300 ^oP and 100 ^oP respectively. Correlate this scale with the centigrade. What is the reading of 0 ^oP and 200 ^oP on the centigrade scale?	2	CO1
(b)	Differentiate between heat and work. Show that both are path function.	3	CO1
Q2	In a boiler and steam turbine plant under steady flow conditions, following observations were recorded: Rate of water inflow to the boiler=7500 kg/h Specific enthalpy of water at inlet=832 kJ/kg Velocity of water at inlet to boiler=345 m/min Water enters the boiler at an elevation=5 m Specific enthalpy of steam leaving the boiler=3123 kJ/kg From boiler steam enters the turbine and velocity of steam at turbine exit=55 m/s Steam leaves the turbine at an elevation=1 m Specific enthalpy of steam at turbine exit=2638 kJ/kg Total heat losses from the turbine and the boiler to the surrounding=90020 kJ/h Determine the power output of the turbine.	5	CO2
Q3(a)	What is a PMM1?	1	CO1
(b)	The internal energy of a certain substance is given by the following equation: $$u=3.56\ pv+84$$ where u is given in kJ/kg, p is in kPa, and v is in m³/kg. A system composed of 3 kg of this substance expands from an initial pressure of 500 kPa and a volume of 0.22 m³ to a final pressure 100 kPa in a process in which pressure and volume are related by $pv^{1.2}$=constant. If the expansion is quasi-static, find heat transfer, change in internal energy and work transfer for the process.	4	CO1