	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Winter Examination – 2022** **Course: B. Tech. Branch :Mechanical Engg. Semester :III** **Subject Code & Name: BTMC303 Thermodynamics** **Max Marks: 60 Date: Duration: 3 Hr.**		
	Instructions to the Students: *1. All the questions are compulsory.* *2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.* *3. Use of non-programmable scientific calculators is allowed.* *4. Assume suitable data wherever necessary and mention it clearly.*		
		(Level/CO)	Marks
Q.1	**Solve Any Two of the following.**		**12**
A)	Explain closed and open system with examples.	CO1	**6**
B)	Derive an equation of work done for constant temperature process in a closed system.	CO1	**6**
C)	Explain Quasi Static process with a neat sketch.	CO1	**6**
Q.2	**Solve Any Two of the following**.		**12**
A)	State and explain first law of thermodynamics for a closed system undergoing a cycle and process.	CO2	**6**
B)	Prove that the Energy – A property of system (Point function).	CO2	**6**
C)	In an air compressor air flows steadily at the rate of 0.5 kg/s through an air compressor. It enters the compressor at 6 m/s with a pressure of 1 bar and a specific volume of 0.85 m^3/kg and leaves at 5 m/s with a pressure of 7 bar and a specific volume of 0.16 m^3/kg. The internal energy of the air leaving is 90 kJ/kg greater than that of the air entering. Cooling water in a jacket surrounding the cylinder absorbs heat from the air at the rate of 60 kJ/s. Calculate : (i) The power required to drive the compressor ; (ii) The inlet and output pipe cross-sectional areas.	CO2	**6**
Q.3	**Solve Any Two of the following**.		**12**
A)	State and explain the Kelvin- Plank and Clausius statements of second law of thermodynamic.	CO3	**6**
B)	Define the Entropy. Explain the Clausius inequality equations.	CO3	**6**
C)	A Carnot cycle operates between source and sink temperatures of 250°C and – 15°C. If the system receives 90 kJ from the source, find: (i) Efficiency of the system (ii) The net work transfer (iii) Heat rejected to sink.	CO3	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	State and explain Boyle's law, Charl's law and Gay-Lussac law.	CO4	**6**
B)	Derive the relation: $C_p - C_v = R$ Where C_p=Specific heat at constant pressure C_v = Specific heat at constant volume R =Characteristic Gas Constant	CO4	**6**

C)	One kg of ideal gas is heated from 18.3°C to 93.4°C. Assuming R=0.287 kJ/kg.k and γ =1.18 for the gas, find out: (i) Specific heats (ii) change in internal energy (iii) Change in enthalpy	CO4	**6**
Q.5	**Solve Any Two of the following.**		**12**
A)	Draw and explain a p-T (pressure-temperature) diagram for a pure substance.	CO5	**6**
B)	Define (i) Triple point (ii) Dryness fraction of steam (iii) Sensible heat and Latent heat.	CO5	**6**
C)	Write a short note on Mollier diagram.	CO5	**6**
	***** End *****		

The grid and the borders of the table will be hidden before final printing.