# DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103

## Semester Examination – May/June - 2019

**Branch: Mechanical Engineering** **Sem.:- III**

**Subject with Subject Code:- Thermodynamics** **Marks: 60**

**Date:- 01/06/2019** **Time:- 3 Hr.**

**Instructions to the Students**

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

**(Marks)**

**Q.1. a)Define thermodynamic system.Give classification of thermodynamic system.** **(06)**

**b)Explain forms of work in detail.** **(06)**

**Q.2. a)State and derive steady flow energy equation and apply to nozzle.** **(06)**

**b)In a steady flow system 50 KJ of work is done per kg of fluid,the values of specific volume,pressure and velocity at the inlet and exit sections are 0.4 $m^3$/kg,600 KPa and 15 m/s and 0.6 $m^3$/Kg,100 kPa and 250 m/srespectively.The inlet is 30mabove exit.The heat loss from the system is 8 KJ/kg.Calculate the change in internal energy per kg of fliud.** **(06)**

**Q.3. a) Prove that efficiency of carnot cycle is given by Carnot Cycle efficiency $(T_1-T_2/T_1)$** **(06)**

**b) A reversible heat engine operates with two environments.In the first it draws 12000 kW from a source at 400 °C and in the second it draws 25000 kW from a source at 100 °C.In both the operations the engine**



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rejects heat to a thermal sink at 20 °C.Determine the operation in which the engine delivers more power. (06)

Q.4. a) Show that entropy is property of system. (06)

b) How much entropy of 5kJ of ice will change as it melts into water at the temperature?Assume latent heat of fusion of ice as 335 kJ/kg at 0°C. (06)

Q.5. a) Explain i)Availability ii) Unavailability iii) Dead state (06)

b)How much of the 1200 kJ of thermal energy at 700 K can be converted touseful work if the environment is at 25°C. (06)

Q.6. a) Draw following charts for steam i)T-S and ii)h-s (03)

b) Explain steam table and their uses (03)

c) A closed system containing 1 kg of air at 10 bar and 227oC expands adiabatically to a pressure of 1 bar.Assuming air as an ideal gas (R=287 J/kgK,$\gamma$=1.4)

i) calculate volume of air before and after expansion.

ii) Determine work done and heat transfer. (06)



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