

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

**Course Code: FT208**

**Course Name: ENGINEERING THERMODYNAMICS AND REACTION KINETICS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any threefull questions, each question carries 10 marks.*

Marks

- |   |    |  |      |
|---|----|--|------|
| 1 | a) | Explain the P-V-T behaviour of pure fluids.  | (7)  |
|   | b) | What is meant by heat capacity of a substance?   | (3)  |
| 2 |    | State the second law of thermodynamics. What are the limitations of first law of thermodynamics?   | (10) |
| 3 | a) | Derive the equation for first law of thermodynamics for flow process.  | (5)  |
|   | b) | From a reservoir at 600K, 1000 J of heat is transferred to an engine that operates on a Carnot's cycle. The engine rejects heat to a reservoir at 300K. Determine the thermal efficiency of the cycle and the work done by the engine.   | (5)  |
| 4 | a) | A steel casting at a temperature 725 K and weighing 35kg is quenched in 150 kg oil at 275 K. If there are no heat losses determine the change in entropy. The specific heat (Cp) of steel is 0.88Kj/kg K and that of oil is 2.5 Kj /kgK. | (5)  |
|   | b) | Differentiate between heat engine and heat pump.   |      |
| 5 |    | Explain the dependency of temperature and pressure on thermodynamic relation using Maxwell's equation  | (10) |
| 6 |    | Explain the dependency of temperature on rate of reaction from transition theory.  | (10) |
| 7 | a) | Explain the significance of Joule Thomson coefficient.   | (5)  |
|   | b) | Explain the role of intermediate complexes in the mechanism of non-elementary reactions.   | (5)  |
| 8 | a) | Prove that $C_p - C_v = \beta^2 VT/K$  | (7)  |
|   | b) | Define reaction rate.  | (3)  |

**PART C**

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|----|--|------|
| 9  | Explain the integral analysis for irreversible second order reaction.                    | (10) |
| 10 | Derive the equation for the time required for the conversion in ideal batch reactor.     | (10) |
| 11 | With neat sketches explain the working of any two reactors.                              | (10) |
| 12 | Explain Michaelis Menten kinetics in explaining the fundamentals of enzymatic reactions. | (10) |
| 13 | Discuss the effect of different variables in enzymatic activity.                         | (10) |
| 14 | Discuss the Monod Equation in study of cell growth kinetics.                             | (10) |