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ID No:

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI - HYDERABAD CAMPUS
FIRST SEMESTER 2022-2023

CHEMICAL ENGINEERING THERMODYNAMICS (CHE F213)

Date: 28 Dec 2022

Comprehensive Exam (Closed Book)

Duration: 30 min

Maximum Marks: 15 M

Instructions:

- ❖ All the questions are mandatory.
- ❖ State and take suitable assumptions, if required.
- ❖ Each question carries 1 M.

PART A

1. Which of the following is an extensive property?
(a) Pressure (b) Density (c) Heat capacity (d) Specific heat capacity
2. For an ideal solution, the value of activity coefficient is ____
3. Which of the following is not a common refrigerant?
(a) Freon-12 (b) Ethylene (c) Ammonia (d) Carbon dioxide
4. Coefficient of performance of a refrigerator operating between 35°C to -50°C is ____
5. Measurement of thermodynamic property of temperature is facilitated by ____ law of thermodynamics
(a) zeroth (b) First (c) Second (d) Third
6. In the reaction, $N_2 + O_2 \rightleftharpoons 2NO$, increasing pressure will result in
(a) Shifting equilibrium towards right
(b) Shifting equilibrium towards left
(c) No change in equilibrium condition
(d) Shifting equilibrium towards right and then continue to shift towards left
7. A gaseous compound is expanded from 5 bar to 1 bar in a closed system. Under which mode (isothermal, adiabatic, isobaric) maximum amount of the ideal work obtains? Explain the reason.
8. In any combustion reactions, what is the standard heat content of O_2 ? ____
9. The freezing point of a liquid decreases when the pressure is increased, if the liquid ____ while freezing.
(a) contracts (b) expands (c) does not change in volume (d) becomes supercritical fluid
10. Gibbs phase rule find application, when heat transfer occurs by
(a) conduction (b) convection (c) radiation (d) condensation
11. Air enters an adiabatic compressor at 300 K. The exit temperature for a compression ratio of 3, assuming air to be an ideal gas ($\gamma = \frac{c_p}{c_v} = 7/5$) and the process to be reversible, is ____

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12. As the pressure approaches zero, the ratio of fugacity to pressure (f/P) for a gas approaches to ____
(a) zero (b) unity (c) infinity (d) an indeterminate value

13. A gas obeys $P(v-b) = RT$. The work obtained from reversible isothermal expansion of one mole of this gas from initial molar volume (v_i) to a final molar volume (v_f) is _____

14. Match the following:

Thermodynamic property

- (1) U
- (2) H
- (3) A
- (4) G

Canonical form variables

- (i) T, P
- (ii) V, S
- (iii) P, S
- (iv) T, V

15. Write the mathematical form of first law of thermodynamics for open systems. Explain the terms.