THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2021
(CUCBCSS-UG)
CC15U CHE3 B03 - PHYSICAL CHEMISTRY - I
(Chemistry - Core Course)
(2015 to 2018 Admissions – Supplementary/Improvement)

Time: Three Hours   Maximum: 80 Marks

SECTION A
Answer *all* questions. Each question carries 1 mark.

1. The most probable velocity(α), average velocity (v) and rms velocity(u) of gas at a definite temperature are in the order ………….

2. The SI unit of van der Waals constant 'a' is ………….

3. Among work, enthalpy and entropy …………. is not a state function?

4. A reaction will never be positive if ΔH is positive and ΔS is ………….

5. When 5 kJ of work is done on the system and 1kJ heat is given out by the system, ΔU = ………….

6. For an exothermic reaction enthalpy change is ………….

7. Melting point of ice …………. with increase of pressure.

8. The SI unit of surface tension is ………….

9. What name is given to the value of molar volume of a liquid when its surface tension is unity?

10. During the vaporization of a liquid, entropy ………….

(10 × 1 = 10 Marks)

SECTION B
Answer any *ten* questions. Each question carries 2 marks.

11. Define critical temperature of a gas

12. Define most probable velocity of a gas

13. What is meant by Boyle temperature of a gas?

14. State and explain law of mass action

15. What is entropy criterion for spontaneity?

16. Define K_x

17. Define entropy of fusion.

18. Discuss Linde's process and Claude's process for the liquefaction of gases.

19. What is Gibb's energy?

20. Define efficiency of heat engine

21. Give Kirchhoff's equation

22. Explain the term spontaneous process

<div align="right">**(10 × 2 = 20 marks)**</div>

SECTION C
Answer any *five* questions. Each question carries 6 marks.

23. Discuss the virial equation of state.

24. Derive the relation between Kp and Kc

25. Relation between Helmoltz free energy (A) and partition function.

26. Derive Gibbs-Duhem equation.

27. Calculate the translational energy of 2 moles of an ideal gas at 300 K

28. Discuss how real gases deviate from Boyles' law

29. Explain the terms C_p and C_v

30. State and explain the Zeroth law of thermodynamics.

<div align="right">**(5 × 6 = 30 Marks)**</div>

SECTION D
Answer any *two* questions. Each question carries 10 marks.

31. Derive the van der Waals equation for a real gas.

32. Discuss the Linde's and Claude's process for liquefaction of gases

33. Describe Carnot's cycle and derive an expression for the efficiency of a heat engine.

34. State Le Chatelier principle and apply it to the equilibrium in the Haber process for the manufacture of ammonia.

<div align="right">**(2 × 10 = 20 Marks)**</div>

****