

25901150

Reg.No :

Name :

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS) REGULAR EXAMINATION March 2026

Fourth SEMESTER

**Discipline Specific Core Course (DSC) - MG4DSCCHE201 - PHYSICAL
CHEMISTRY - 1**

(2024 ADMISSION ONWARDS)

Duration: 1 hour 30 minutes

Maximum Marks: 50

***Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate(E), Create(C), Skill(S), Interest(I)
and Appreciation(Ap)***

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A

Multiple choice questions

Answer all questions

Each question carries **1** marks

- 1 poise equals [A] / [CO1]
 - 1 kgms⁻²
 - 1 kgm⁻¹s⁻¹
 - 0.1 kgm⁻¹s⁻¹
 - 10 kgms⁻²
- The degree of ionization of a weak electrolyte increases with [U] / [CO2]
 - Increase in dilution
 - increase in concentration
 - increase in temperature
 - Presence of a common ion
- The molal elevation constant (K_b) is also known as : [U] / [CO4]
 - Van't Hoff factor
 - Cryoscopic constant
 - Equilibrium constant
 - Ebullioscopic constant
- Which is the correct expression for critical pressure in terms of van der Waal's constants a and b? [K] / [CO1]

- a). $3b$ b). $8a/27Rb$ c). $a/27b^2$ d). $8a/27b^2$
5. Buffer action is based on the principle of [A] / [CO2]
 a). Neutralization b). Common ion effect
 c). Oxidation d). Precipitation
6. Henry's law states that at constant temperature, the solubility of a gas in a liquid is: [K] / [CO4]
 a). Directly proportional to pressure of the gas b). Inversely proportional to pressure of the gas
 c). Independent of pressure d). Proportional to volume of liquid
7. What is the SI unit of van der Waals constant 'a' . [E] / [CO1]
 a). Nm^4mol^{-2} b). $atm L^2mol^{-2}$ c). $atm L^{-2}mol^{-2}$ d). $Nm^{-4}mol^2$
8. According to Ostwald's dilution law for a weak electrolyte, the degree of dissociation is to the square root of concentration. [K] / [CO2]
 a). directly proportional b). inversely proportional
 c). equal d). None of these
9. Which among the following is a colligative property? [K] / [CO4]
 a). Boiling point b). Melting Point c). Osmotic Pressure d). Freezing Point
10. At Boyle temperature the second Virial coefficient is [K] / [CO1]
 a). Positive b). Negative c). One d). Zero

[1x10 = 10]

Part B

Short Answer Questions

Answer any **4** questions

Each question carries **5** marks

11. Sketch the Maxwell-Boltzman distribution curve for two different temperatures and explain the influence of temperature on distribution [U] / [CO1]
12. Define ionic product of water. Derive its expression and state its significance. [K] / [CO2]

13. Explain in detail one application of a simple eutectic system in metallurgy. [U] / [CO3]
14. Explain the principle of reverse osmosis. How is reverse osmosis used in the purification of seawater? Mention its advantages. [U] / [CO4]
15. Determine the pH of a solution obtained by mixing equal volumes of 0.020 N NH_4OH and 0.20 N NH_4NO_3 solutions. (K_b for NH_4OH is 1.80×10^{-5}). [A] / [CO2]
16. Evaluate the possibility of separating a mixture of 95.6% ethanol and 4.4% water using simple fractional distillation at constant atmospheric pressure. [E] / [CO4]

[5x4 = 20]

Part C

Short Essay Questions

Answer any **2** questions

Each question carries **10** marks

17. Explain Andrew's experiments on isotherms of a real gas and discuss their significance. [E] / [CO1]
18. Discuss the Lowry-Bronsted theory and the Lewis theory of acids and bases. [K] / [CO2]
19. Explain a simple eutectic system using lead-silver as an example. Apply phase rule. [U] / [CO3]
20. Evaluate a Minimum Boiling Azeotrope and a Maximum Boiling Azeotrope by relating them to their respective types of Raoult's Law deviations. [E] / [CO4]

[10x2 = 20]