GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2022-2023

CHEMISTRY

CH101

TIME ALLOTTED: 3 Hours **FULL MARKS: 70**

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable

GROUP – A

(Multiple Choice Type Questions)

Answer any ***ten*** from the following, choosing the correct alternative of each question: 10×1=10

		Marks	CO No.
1. i)	How many different spectral emission lines are conventionally obtained in the emission spectra of H atom a) 3 b) 4 c) 5 d) 2	1	CO4
ii)	The cell reaction is spontaneous if the cell potential is a) positive b) negative c) zero d) infinite	1	CO2
iii)	For volatile metal oxide, a) corrosion occurs at a faster rate b) corrosion occurs at a slower rate c) corrosion does not take place d) protective corrosion occurs	1	CO4
iv)	Ion exchange method is used a) To remove permanent of water b) To protect metal from corrosion c) To measure alkalinity of water d) To measure chloride ion in water	1	CO3
v)	Absorbance of a sample is calculated from a) Raoult's Law b) Lambert-Beer's law c) Pauli's Exclusion Principle d) Golden Rule	1	CO5

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vii)	The quantity which is not changed in an adiabatic reversible process is a) entropy b) enthalpy c) free energy d) both (a)and (c)	1	CO1
viii)	Which statement is correct? In H atom emission spectrum, a) All Balmer lines ends at n=2 level b) All Lyman lines ends at n=2 level c) All Paschen lines ends at n=2 level d) All Bracket lines ends at n=2 level	1	CO1
ix)	Atomic size of the elements in the periodic table a) decreases from left to right b) increases from left to right c) decreases down the group d) does not change down the group	1	CO1
x)	A change in internal energy of the system depends on a) Initial state and final state of the system b) The reversible path c) The irreversibility of the process d) The initial state of the system only	1	CO2
xi)	For an exothermic reaction, a) Δ H is positive b) Δ H is negative c) Δ H = 0 d) Δ U is negative	1	CO2
xii)	Paracetamol used as a) Tranquilizer b) pain killer c) to reduce body temperature (fever) d) both b and c	1	CO3

GROUP – B
(Short Answer Type Questions)
(Answer any *three* of the following) 3×5 = 15

		Marks	CO No.
2.	What is inductive effect? How do you explain the stability of carbocations from inductive effect?	5	CO3
3.	Efficiency of a heat engine is always less than unity; explain in the light of Carnot's Cycle.	5	CO4
4.	Classify polymers according to the tacticity and thermal response.	5	CO3
5. a)	Write down the drawbacks of Bohr's Postulates.	2	CO1
b)	Explain the basic principle of IR activity.	3	CO4
6. a)	Why formic acid is stronger than acetic acid?	2	CO3
b)	Write van der Walls's equation of state for n moles of a real gas. Explain the terms involved.	3	CO4

GROUP –C
(Long Answer Type Questions)
(Answer any *three* of the following) 3×15 = 45

		Marks	CO No.
7. a)	What is hard water? What are the types of hardness? How it can be removed?	5	CO3
b)	2 moles of ammonia are enclosed in a 5 lit flask at 27°C. Calculate the pressure assuming the gas behaves as a real gas.(a= 4.17 and b= 0.037, a & b has their usual units)	5	CO5
c)	Calculate the entropy change for the heating of 7gms of N_2 from 300K to 500K at constant volume, given Cp= 7 cal/mol.	3	CO2
d)	Why corrosion is a spontaneous process?	2	CO3
8. a)	Write a comparative discussion on S_N1 and S_N2 reactions involving a) rate equation b) mechanism c) potential energy diagram d) implication of stereochemistry, if any.	8	CO5
b)	What is electrochemical corrosion? Give details reactions of the formation of rust.	4	CO3
c)	Why anodic protection is better than cathodic protection?	3	CO3
9. a)	What is Gibbs free energy? What is its physical significance?	5	CO1
b)	What is entropy? What is its physical significance?	5	CO1
c)	Draw and level all possible modes of vibration for CO_2 molecule and indicate the IR active and inactive modes.	3	CO5
d)	How reducing property of elements vary down a group? Explain.	2	CO1

10.	a)	What are quantum numbers and what do they signify?	5	CO1
	b)	Though F is higher electronegative than Cl, but Cl has higher electron affinity than F. Why? Explain the oxidizing trend of the elements in the Periodic table.	5	CO1
	c)	Write down the Schrödinger wave equation in its standard form and define each term in it. An electron is in 4f orbital. What will be the possible value of n, l and m?	5	CO1
11.		Write short notes on (any three)	3×5=15	
	a)	Effect of conjugation on IR spectra	5	CO5
	b)	Exchange energy	5	CO1
	c)	Lambert-Beer's law	5	CO5
	d)	Resonance	5	CO4
	e)	Finger print region in IR spectroscopy	5	CO4