GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
CHEMISTRY
CH201

TIME ALLOTTED: 3 Hrs **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)	The reaction occurs spontaneously when a) $\Delta G=0$ b) $\Delta G>0$ c) $\Delta G<0$ d) Both (a) and (c)	1	CO4
	(ii)	Ion exchange method is used a) To remove permanent hardness of water b) To protect metal from corrosion c) To measure alkalinity of water d) To measure chloride ion in water	1	CO5
	(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)	Nylon 6,6 is an example of a) co polymer b) homo polymer c) amorphous polymer d) natural polymer	1	CO3
	(v)	IR spectra normally carried on a) Liquid sample b) Gas samples c) Solid samples d) All	1	CO5

(vi)	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
(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)	Hardness of water is caused by the a) Ag^{+} b) Zn^{2+} c) Ca^{2+} d) Na^{+}	1	CO3
(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)	Choose the correct statement a) wave number is directly proportional to energy b) wave number is inversely proportional to energy c) wave length is directly proportional to energy d) frequency is inversely proportional to energy	1	CO3
(xii)	If the concentration of nucleophile is increased the rate of S_N^1 reaction a) Increases b) Decreases c) Remain same d) None of these	1	CO3

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

		Marks	CO No.
2.	Why Lewis acid is required for Friedel-craft reaction of benzene? Explain with mechanism. Which solvent is used in this reaction?	5	CO3
3. a)	Why formic acid is stronger than acetic acid?	2	CO3

b)	Deduce the expression for the maximum work done in the isothermal process.	3	CO1
4.	Calculate the temporary and permanent hardness of a water sample from the following data: $Ca(HCO_3)_2$ = 16.2 mg/L $Mg(HCO_3)_2$ = 7.3 mg/L $MgCl_2$ = 9.5 mg/L $CaSO_4$ = 13.6 mg/L	5	CO4
5. a)	What are state functions? State their characteristics.	2	CO1
b)	Find out the eigen value of the function $f(x)$ with respect to d^2/dx^2 operator. Given $f(x)= a\sin 2\pi x/\lambda$	3	CO1
6. a)	What are the differences between thermoplastic and thermosetting plastic?	3	CO3
b)	What is inert pair effect?	2	CO1

GROUP –C
(Long Answer Type Questions)

(Answer any *three* of the following) **3×15 = 45**

		Marks	CO No.
7. a)	Calculate the wavelength associated with 20300 cm^{-1} wave number.	2	CO5
b)	What is inductive effect? How does it affect the physical property of a molecule?	3	CO4
c)	Explain the periodic trend on atomic size in light of Bohr's theory.	5	CO1
d)	What is electrochemical corrosion? Explain the formation of Rust with reactions.	5	CO4
8. a)	What is crystalline polymer? What are the characteristics of crystalline polymer? Give an example of this type with structure.	5	CO3
b)	Racemization takes place in S_N1 reaction and inversion of configuration takes place in S_N2 reaction. Explain with example.	5	CO3
c)	What are the reagents for the synthesis of paracetamol?	2	CO5
d)	Discuss the protective measures of Corrosion.	3	CO3
9. a)	Entropy reaches to maximum value at the point of equilibrium. Explain.	2	CO1
b)	What is Gibb's free energy? What is its physical significance?	3	CO2
c)	Calculate the e.m.f. of a Daniel Cell at 25 °C when $[ZnSO_4]$ = 0.001(M) and $[CuSO_4]$ = 0.1(M). E° of a Daniel cell is 1.1 volt.	3	CO5
d)	Explain the correct electronic configuration of Cr in the view of exchange energy concept.	2	CO1
e)	Why does benzene undergo electrophilic substitution rather than nucleophilic substitution? Why phenol is more easily nitrated than benzene?	5	CO3
10. a)	State and explain the 1st law of Thermodynamics? What is internal energy?	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 differences between an orbit and an orbital.	5	CO1

11.	Write short notes on (any three)	3×5=15		
	a) Bio-polymer	5	CO3	
	b) Exchange energy	5	CO1	
	c) Lambert-Beer's law	5	CO5	
	d) Hybridization of carbon atoms in organic compounds	5	CO4	
	e) Tacticity of polymers	5	CO4	

2nd Sem
All