



# VIT<sup>®</sup>

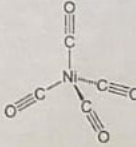

Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)  
CHENNAI

Name of Examination	Continuous Assessment Test-1 (CAT-I), Winter Semester 2022-23		
Slot: EI	Course Mode : Offline	Class Number (s): CH2022232300222	
Course Code:	BCHY101L	Course Title:	Engineering Chemistry
Faculty Name:	Dr Depanjan Sarkar	School:	SAS

General Instructions: **CLOSED BOOK Examination**

Answer any **Five** Questions

Total Marks: 5 X 10 Marks = 50

Q. No	Sub-division	Question Text	Marks
1.	i)	2 mole of an ideal gas expands reversibly under isothermal condition from a volume of 60 dm <sup>3</sup> to 600 dm <sup>3</sup> at a temperature of 27°C. Calculate the change in entropy. (5 Marks) [R: 8.314 J K <sup>-1</sup> mol <sup>-1</sup> ] $1.013 \times 10^5$	10
	ii)	Heat supplied to a Carnot engine is 3500 kJ. How much useful work can be done by the engine which works between 0°C and 50°C. (5 Marks)	
2.	i)	Derive the relation of half-life with rate constant for first order reaction. (5 marks)	10
	ii)	The values of rate constants for a reaction are 10x10 <sup>-4</sup> L/mol.s and 10x10 <sup>-2</sup> L/mol.s at temperatures 200K and 300 K respectively. Calculate the activation energy. (5 marks)	
3.	i)	Match the following: (2 marks) (a) Adiabatic : (e) constant volume (b) Isothermal: (f) constant pressure (c) Isobaric: (g) no heat transferred (d) Isochoric: (h) constant temperature	10
	ii)	What is pseudo first order reaction. Explain briefly with an example (3 marks)	
	iii)	How activation energy of a reaction is influenced by a catalyst? explain with diagram. (5 Marks)	
4.	i)	Show the electron count in the following complexes (5 Marks):  a) Ni(CO) <sub>4</sub>   b) η <sup>5</sup> -CpReCl <sub>2</sub> (η <sup>2</sup> -SCH <sub>2</sub> CH <sub>2</sub> S) 	10
	ii)	Discuss briefly the role of Mg <sup>2+</sup> in photosynthesis process. (5 Marks)	
5.		Calculate the crystal field stabilization energy, hybridization and magnetic moment of [Ni(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup> , and [Co(CN) <sub>6</sub> ] <sup>4-</sup> . $n(n+2)$	10

6.	i)	Briefly discuss any two applications of coordination complexes. (5 Marks)	10
	ii)	Write down the magnetic property, hybridization, and brief applications of ferrocene. (5 Marks)	

Reference:

3	4	5	6	7	8	9	10	11	12
21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn
39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd
57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg
89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn