Name of Examination	**CAT-I, Fall 2**021-22 Semester, (October 2021)	
Slot: D1+TD1	Course Mode : CBL	**Class Number (s):** VL2021220106468

Course Code:	BCHY101L	Course Title:	Engineering Chemistry

*General Instructions (if any):**1. OPEN BOOK Examinations, 2. Allowed to use printed/hand written subject materials during examinations.***

Q. No.	Sub-division	Question Text	Marks	Unit / Module No.	HOTS? (Y/N)	Difficulty Level E/A/T	CO
Answer Any **Six** Questions			Total Marks: 6 X 10 Marks = 60				
1	i a)	Give an example of a spontaneous reaction. Discuss the thermodynamic parameters that decide spontaneity of a chemical reaction.	5	**1**	Y	E	CO1
	ib)	One mole of an ideal gas expands against constant pressure with volume change 10-30 dm^3. Determine the work done by the gas in joules. Indicate the work done if there is no volume change.	5				
	iia)	Provide an example each for exothermic and endothermic reactions. Discuss the free energy change of such reactions.	5				
	iib)	One mole of an ideal gas expands against 1 atm of constant pressure with volume change 10-40 dm^3. Determine the work done by the gas in joules. Draw a graph of P vs V for the expansion and indicate the work done.	5				
	iiia)	Discuss the thermodynamic conditions for (i) formation of water from hydrogen and oxygen (ii) melting of ice	5				
	iiib)	1 mole of an ideal gas expands 5 dm^3 to 10 dm^3 against 1 atm pressure. Determine the work done by the gas in joules. Depict the same in P vs V graph.	5				
	iva)	How does the conversion of graphite to diamond a favourable reaction? Explain.	5				
	ivb)	The work done by 1 mole of an ideal gas against 1 atm pressure from the initial volume of 10 dm^3 is -4052 J. Determine the final volume of expansion.	5				
2	i	Ni present in $Ni(CO)_4$ and $Ni(CN)_4^{2-}$ exhibits two different geometries. Explain with the aid of VB theory. Draw the crystal field splitting in both complexes based on CFT.	10	**2**	Y	Tough (T)	CO1
	ii	Octahedral geometry is expected for sp^3d^2 and d^2sp^3 hybridization. Explain with the aid of VB theory using two suitable examples. Draw the crystal field splitting in both complexes based on CFT.	10				
	iii	Justify the formation of σ and π bonds in metal carbonyls. Give an example of homo polynuclear carbonyl and explain its structure.	10				
	iv	There are reactions of organometallics in which (i) no	10				

		change in formal oxidation state (ii) change in formal oxidation state of the central metal ion are noticed. Explain with suitable examples.					
3	ia)	Both temperature and catalyst play significant role on the rate of a chemical reaction. Provide suitable explanation.	5				
	ib)	Why chlorophyll is green in color? Explain the role of Mg in chlorophyll.	5		Y	M	CO1
	iia)	Chemical reactions can be kinetically controlled by catalysts. Explain. Give two examples each one for homogeneous and heterogeneous catalysts with reactions.	5				
	iib)	Give the detailed process involved in photosynthesis and the role of chlorophyll in it.	5	**1, 2**			
	iiia)	Illustrate homogeneous and heterogeneous catalysis with suitable examples.	5				
	iiib)	Give an account on the structure and functioning of hemoglobin.	5				
	iva)	Discuss the kinetics of ester hydrolysis.	5				
	ivb)	Analyse and bring out the structural difference between chlorophyll and haemoglobin.	5				

G. Buvaneswari/17-10-21

Signature with date