VIT

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

Re-Final Assessment Test (FAT) – May/June 2022

	: B Tech	Semester	:	FALL 21-22
	: BCHY101L	Class Nbr(s)	:	
	: Engineering Chemistry	Slot	:	
Faculty(s)	: Dr. Jayanta Parui			
Time	: Three Hours	Max. Marks	:	100

General Instructions (if any graph, chart etc.required): not required

Answer ANY TEN Questions

		Explain second law of thermodynamics with an example.	5
	b.	Draw and describe activation energy for a reaction progression. Also indicate in your drawing the effect of positive catalyst.	5
2.	a.	Describe crystal field theory (CFT) explaining the loss of d orbital degeneracy.	5
	b.	Write down the beneficial chemical aspect having Mg ion in chlorophyll.	5
3.	a.	Draw the structural formula and write down their total number of pi electrons as per the given criteria: i. aromatic carbocyclic compound ii. anti-aromatic carbocyclic compound iii. non aromatic carbocyclic compound iv. aromatic heterocyclic compound v. anti-aromatic heterocyclic compound	5
	b.	Write down the drawbacks of natural dyes and describe the synthesis of indigotin with the chemical reaction.	5
4.	a.	Describe the chemistry of Li ion secondary battery with relevant chemical reactions. Explain the reason intercalation of Li in an electrode for such battery.	5
	b.	Explain with the drawing of a device structure that organic dye can be used as an absorber layer for solar cell. Write down the relevant chemical reactions that make the device renewable energy source.	5
5.	a.	Draw any one of the crystal structures of AB type solid distinguishing the position of A and B in it. Also write down a compound with respect to your drawn structure.	5
	b.	Differentiate nano and bulk materials. What is quantum dot? Write down a benefit of quantum dot.	5
6.	a.	Write down the different types of light matter interactions.	5
	b.	From the Bragg model of diffraction establish a mathematical relationship for the measurement of d spacing in crystal.	5

7.	a.	For procurement of fuel which value among NCV and GCV should be given more importance? Justify your answer. Also, explain the requirement of anti-knocking agent for the liquid hydrocarbon fuel.	5
	b.	Describe a physical vapour deposition (PVD) method with drawings for anodic protection coating on iron.	5
8.	a.	Draw the structural formulas of the following compounds: $Fe(CO)_3(\eta^5 - C_5H_5)$ & $Co_2(\mu - CO)_2(CO)_6$.	5
	b.	2.5 mol of an ideal gas expands isothermally and reversibly at 50 °C from a volume of 15 dm^3 to a volume of 30 dm^3. Calculate the work done by the gas in Joules. Also, calculate the change in entropy for the process.	5
9.	a.	Describe a solid oxide fuel cell that utilizes CO as fuel. Also draw its construction along with related reactions.	5
	b.	b) Arrange the intermediates i. tri-propyl cation, ii. tri – isopropyl cation and iii. tri-tert-butyl cation in the order of highest stability to lowest. Justify your answer.	5
10.	a.	Describe water purification through zeolite along with related drawings and chemical equations. Is this process suitable for ions free water production? Justify your answer.	5
	b.	Write down the differences between thermosetting and thermoplastic polymers.	5
11.	a.	With an appropriate example, draw the structural and electronic criteria for a conducting polymer. Also, write down two different ways to increase the conductivity of a conducting polymer.	5
	b.	Estimate the particle size in nm of the given nanomaterial using p-XRD data: Peak position $2\theta = 22.44$ degree, FWHM of sample = 3.1degree, k = 0.9 and $\lambda = 1.5406$ Å (degree to radian=Degree$\times\pi/180$).	5

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