Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**
PAC1A101

1st Semester Regular Examination 2019-20
APPLIED CHEMISTRY
BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FAT, IEE, IT, MANUFAC, MANUTECH, MECH, METTA, MINERAL, MINING, MME, PE, PLASTIC, PT, TEXTILE

Time : 3 Hours
Max Marks : 100
Q.CODE : HB631

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1		**Answer the following questions :**	**(2 x 10)**
	a)	Define the term "Ultraviolet catastrophe"	**(2)**
	b)	The fundamental vibrational frequency of HCl is $8.667\times10^{13}s^{-1}$.Calculate the force constant	**(2)**
	c)	IR spectra are often characterized as molecular fingerprint. Justify	**(2)**
	d)	What is the significance of the negative slope of fusion curve of ice in water system?	**(2)**
	e)	What is EAN rule?	**(2)**
	f)	Bolt and nut made of different material. Mention the type of corrosion.	**(2)**
	g)	What is Wilkinson's catalyst? Write one uses of it.	**(2)**
	h)	Write one organometallic catalyst each for hydrogenation olefin and polymerization reaction.	**(2)**
	i)	What is condensed phase rule? Give an example of a system where condensed phase rule is applied.	**(2)**
	j)	Mention three factors taken in consideration while selecting coal for different use.	**(2)**

Part- II

Q2		**Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**	**(8 x 6)**
	a)	Show that the energy of a particle in one dimensional box is E= $\frac{n2h2}{8ma2}$	**(6)**
	b)	What are the general steps involved in the homogeneous catalysis using organometallic.	**(6)**
	c)	Internuclear distance of HCl molecule (rigid type) is 129pm.Calculate its rotational constant in cm^{-1} and find the wavelength of the transition between rotational energy levels J=2 to J-3.	**(6)**
	d)	Define the term phase, component and degrees of freedom with suitable examples.	**(6)**
	e)	Discuss the phase diagram of Bi-Cd system.	**(6)**
	f)	State three quantum numbers used to describe an orbital specify the permissible values of each quantum numbers	**(6)**
	g)	Describe how the calorific value of a solid fuel is determined by using a bomb calorimeter.	**(6)**
	h)	0A sample of coal has the following composition C=90%, H=4.5%, O=3%, S=0.5%, N=0.5% and ash =2.5%.Find the gross as well as net calorific value.	**(6)**
	i)	What is cathodic protection? Explain sacrificial anode method.	**(6)**
	j)	Discuss the factors affecting corrosion.	**(6)**
	k)	Describe knocking of petrol engine and octane number.	**(6)**
	l)	Explain the mechanism of differential aeration corrosion with reference to irin materials.	**(6)**

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four) **(16×2)**

Q3	**a)**	State and explain Beer-Lambert's law and its importance in spectroscopic methods of structure elucidation	**(10)**
	b)	Write the basic principles of UV-Visible spectroscopy.	**(6)**
Q4	**a)**	Derive the expression for the energy and frequency a diatomic molecules by assuming the molecule behaving as simple harmonic oscillator.	**(8)**

	b)	Write the theory of vibrational spectroscopy.	**(8)**
Q5	**a)**	Draw and explain the phase diagram of Sulphur system. Why all four phases of Sulphur system do not co-exist at equilibrium	**(8)**
	b)	What is electrochemical corrosion? Describe the mechanism of electrochemical corrosion by hydrogen evolution type and oxygen absorption.	**(8)**
Q6	**a)**	Discuss I brief the proximity analysis of coal	**(8)**
	b)	Describe the classification and applications of Organometallic compounds	**(8)**