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

Total Number of Pages : 02

B.Tech
RCH1A002

1st Semester Regular/Back Examination 2019-20

CHEMISTRY

BRANCH : AEIE, AERO, AG, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, CST, ECE, EEE, EIE, ELECTRICAL, ELECTRICAL & C.E, ELECTRONICS & C.E, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC, MANUTECH, MARINE, MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, PT, TEXTILE

Time : 3 Hours

Max Marks : 100

Q.CODE : HRB633

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)	Identify the microwave active molecules(s).Give reasons CO, CH_3Cl,H_2O,CH_3-CH_3,Cl_4, CO_2, HCl , NH_3	(2)
	b)	Define the term "Ultraviolet catastrophe" using the energy density plot.	(2)
	c)	Λ_{max} for aniline shift from 230nm in neutral medium to 203nm in acidic medium. Explain	(2)
	d)	What is the significance of the negative slope of fusion curve of ice in water system?	(2)
	e)	Write two uses of Ag nano particles.	(2)
	f)	Why does part of nail inside the wood undergoes corrosion easily?	(2)
	g)	Write one organometallic catalyst each for hydrogenation olefin and polymerization reaction.	(2)
	h)	What is condensed phase rule? Give an example of a system where condensed phase rule is applied.	(2)
	i)	Mention three factors taken in consideration while selecting col for different use.	(2)
	j)	Why gasoline-containing TEL is used in internal combustion engine?	(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)	The frequency of oscillation of HF is 5×10^{12} Hz. Calculate the force constant and vibrational energy in Joule and cm-1.Calculate the zero point energy of the molecule.	(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)	0.72g of a fuel containing 80% carbon, when burnt in a bomb calorimeter , increased the temperature of water from 227.3 °C to 29.1 °C .If the calorimeter contains 250g of water and its water equivalent is 150grams, calculate the HCV of the fuel. Write the answer in LJ/kg.	(6)
	i)	What is cathodic protection? Explain sacrificial anode method.	(6)
	j)	Discuss the factors affecting corrosion.	(6)
	k)	Explain Sol-Gel synthesis for producing nanomaterials. Explain with help of a neat sketch.	(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. The absorbance of a 2.5×10^{-4} M solution taken in a 1 cm is 1.17.Calculalte the molar extinction coefficient.	(8)
	b)	Write the basic principles of UV-Visible spectroscopy.	(8)
Q4	a)	Derive the expression for the energy and frequency a diatomic molecules by assuming the molecule behaving as simple harmonic oscillator.	(8)
	b)	What do fundamental and overtone vibrations mean? HCl shows intense absorption peak at 2900 cm-1 and weak one at 8600 cm-1.Calcualte the anharmonicity constant	(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)	Discuss the applications of nanotechnology in electronics.	(8)