1st Semester Back Examination 2017-2018
CHEMISTRY
BRANCH: AERO, AUTO, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ETC, FAT, IT, MECH, METTAMIN, MME, PE
Time: 3 Hours
Max Marks: 100
Q.CODE: B820
Answer Question No.1 and 2 which are compulsory and any four from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** *multiple type or dash fill up type* **(2 x 10)**

(a) Condensed phase Rule is……………..

(b) The existence of solid substance in more than one crystalline form is called as…………………

(c) Electrode reaction of calomel electrode is …………………

(d) Bond order of O_2^- is ………………

(e) In exothermic reaction which has more energy? Product or reactant .

(f) E_a for for ward reaction is 40kj mol^{-1} and reserve reaction is 60KJ^{-1} The reaction is

(g) A cubic has ………………three fold axes of symmetry

(h) All the crystal except …………are anisotropic

(i) Two mole of ideal gas expand spontanesoluly in to vacuum. The work done is …………………

(j) Give an example of Negative catalyst ……………

Q2 **Answer the following questions:** *Short answer type* **(2 x 10)**

(a) Two moles of perfect gas are expanded from a pressure of 20Nm^{-2} to 1Nm^{-2} at 300K What is the free energy.

(b) How the T∂S does Determines the spontaneous of reaction?

(c) What is the de-Broglie wavelength of an electron travelling at 1% of the speed of light?

(d) Write the decreasing order of stability for the following:
H_2, H_2^+, H_2^- and justify

(e) Calculate the activation energy of a chemical reaction which doubles the rate when the temperature is raised from 300K to 310K.

(f) While studying the decomposition of N_2O_5 it is observed that a plot of it partial pressure VS time is linear What kinetic parameter can be obtained from this observation.

(g) Give the unit of rate constant of a second order reaction with example

(h) What is difference between the triple point and critical point explain with example

(i) What are the Miller indices, if the plane intersects the crystal lattice at 2a, b,2c ?

(j) Explain why the order of a reaction cannot be predicted from overall stoichiometry

Q3 **(a)** With the help of the Phase rule, draw and describe the phase diagram of. Sulphur system **(10)**

(b) Iodine Molecule Dissociate in to atom after Absorbing radiation of 4500A^0.If one quantum of radiation is absorbed by each molecule.Calculate lattice energy of Iodine atom.(Bond energy of iodine=240KJ **(5)**

Q4 **(a)** Draw the molecular orbital configuration of O_2 O_2^- O_2^+. .Compare between them in reference to magnetic behavior and bond length. **(10)**

(b) The standard electrode potentials of the electrodes, Ag+(aq)/Ag(s), an Fe3+(aq)/Fe2+(aq), are 0.799 V and 0.771 V at 298 K, respectively. Write down the electrode reactions and designate the cell. Calculate the equilibrium constant for the cell reaction at 298 K **(5)**

Q5 **(a)** What do you mean by the Lattice energy ?How do you calculate the lattice of Nacl explain. **(5)**

(b) What do you mean by the Lattice energy ?How do you calculate the lattice of Nacl explain. **(5)**

(c) How is fuel cell different from battery? What are the advantages of fuel cells **(5)**

Q6 **(a)** It was found that a cane sugar solution in water was hydrolysed to the extent 25 percent in one hour .Calculate the time that will be taken for sugar to be hydrolyzed to the extents of 50%Assuming that reaction is of first order **(5)**

(b) Derive an expression for second order reaction when two reactant are Different **(5)**

(c) Calculate the uncertainty in velocity for a particle with mass 7x10-18 kg, if the uncertainty in position is 0.1 nm **(5)**

Q7 **(a)** (i) $(\partial S/\partial P)_T = -(\partial V/\partial T)_P$ **(7)**

(ii) $(\partial V/\partial S)_P = (\partial T/\partial P)_S$

(b) A second order reaction, when two reactants are same, is 30% completed in 500 seconds. How long will it take to go to 90% completion **(4)**

(c) How is fuel cell different from battery? What are the advantages of fuel cells **(4)**

Q8 **(a)** Show that fcc lattice has more effective packing than sc lattice. **(5)**

b) State and explain Hess's law of constant heat summation. **(6)**

(c) What information's are conveyed by ψ and ψ2? **(4)**

Q9 **(a)** What is a catalyst? Write down the characteristics of catalysts **(5)**

(b) By the help of molecular orbital theory, show that the bond order of Nitrogen is three. **(5)**

(c) Explain the potentiometric method to determine the emf of a cell. **(5)**