

Registration No:

--	--	--	--	--	--	--	--	--	--

Total Number of Pages: 02

B.TECH
PAC2A102

2nd Semester Regular Examination 2016-17

APPLIED CHEMISTRY

BRANCH: ALL

Time: 3 Hours

Max Marks: 100

Q.CODE: Z462

**Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.**

Part – A (Answer all the questions)

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

- a) In general corrosion is maximum when pH of corroding medium is
- b) Write the formulae of ferrocene.
- c) Which gas among the following has least calorific value?
(1) coal gas(2)water gas(3) Producer Gas(4) Natural Gas
- d) Condensed phase rule is applicable to which system?
(1) water system (2) sulphur system (3) Bi-Cd system (4)All one component system
- e) We observe the $\sigma \rightarrow \sigma^*$ transition below.....nm.
- f) The molecular vibration at which we observe change in bond length is called
- g) In cathodic coating, base metal is coated with
- h) Unit of Optical density is
- i) The cetane rating of Hexadecane is ... (1)100(2) 50 (3) 0 (4) None
- j) In sulphur system sublimation curve is .(1) Non variant (2) Bivariant (3) monovariant (4) Trivariant

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

- a) What is the difference between critical point and triple point ?
- b) What do you mean by fundamental vibration? What is the formula for calculation of fundamental vibration of linear molecule?
- c) Write down the condition for normalization of wave function.
- d) What do you mean by Auxochrome and Chromophore? What structural features may produce a bathochromic shift in an organic compound?
- e) What is the frequency of oscillation of CO having force constant 1600Nm^{-1} ?
- f) Write down the names of following ligands In their anionic form (CH_3^- C_2H_5^- ?
- g) Predict the possible electronic transition in the following compound CH_4 , CH_3Cl_2 , Cl_2

- h) Calculate the weight and volume of air required for combustion of 2kg of carbon.
- i) Rusting of iron is faster in saline water than in ordinary water. Give reason.
- j) Write down the Physical interpretation of Ψ .

Part – B (Answer any four questions)

- Q3** a) What do you mean by operator in quantum mechanics? Discuss linear operator, square operator, commutator operator, multiplication operator with one example from each. **(10)**
- b) Calculate volume of air required for complete combustion of 1m^3 gaseous fuel having composition: CO = 48% H₂ = 40%, C₂H₂ = 2% , N₂ = 1.0% and remaining ash. **(5)**
- Q4** a) Derive Schrödinger wave equation with respect to space and with respect to time. **(10)**
- b) Write short notes on differential aeration corrosion. **(5)**
- Q5** a) What do you mean by fundamental vibration? Some fundamental vibrations are infrared active while the others are not. Explain. **(5)**
- b) Define the term phase, component, and degree of freedom. Discuss the phase diagram of sulphur system in details (curve ,area ,triple point and metastable equilibrium). **(10)**
- Q6** a) Why organometallic compound are used as catalysts? Discuss the catalytic activity of Ziegler-Natta catalyst . **(5)**
- b) What do you mean by fuel? Discuss the manufacture, advantages and disadvantages of non-petroleum fuel POWER ALCOHOL. **(5)**
- (c) Calculate GCV and NCV value of coal sample having the following composition: C = 82% : H₂ = 8%, O₂ = 5%, S = 2.5%, N₂ = 1.4% and Ash =2.1% . **(5)**
- Q7** a) What do you mean by electrochemical corrosion? Discuss the mechanism of electrochemical corrosion **(7)**
- b) A light of wave length 400 nm is passed through a cell of 2nm path length containing 10^{-3} mol dm⁻³ of compound X if absorbance of this solution is 0.5, calculate the molar absorption coefficient and transmittance **(4)**
- (c) What is an ultraviolet spectrum? Give various region associated with ultraviolet spectrum . **(4)**
- Q8** a) Discuss the role of nature oxide formed in oxidation corrosion .state and explain Pilling Bedworth rule . **(5)**
- b) Write down the postulates of quantum mechanics (only brief description). **(6)**
- (c) Write short notes on wave- particle duality of light **(4)**
- Q9** a) Write short notes on moving -bed catalytic cracking. **(5)**
- b) The first line of rotational spectrum of CO is 3.84235cm^{-1} . Calculate the rotational constant (B), Moment of inertia (I) and reduce mass. **(5)**
- (c) What do you mean by eutectic mixture? Discuss the characteristic of eutectic mixture. **(5)**