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**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. (CBCS) I-Semester Supplementary Examinations, June/July-2019**

**Chemistry-I**

(Common to all branches)

Time: 3 hours

Max. Marks: 60

*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

- Differentiate between single electrode and standard electrode potential.
- Can we use copper rod to stir HCl solution, given that  $E^\circ$  of  $\text{Cu}^{2+}/\text{Cu}$  and  $\text{H}^+/\text{H}_2$  are 0.34 and 0.00V respectively-Explain.
- Discuss the principle of cathodic protection and explain one method.
- Explain the type of corrosion when bolt and nut made from different metals are in contact with each other.
- Differentiate between petrol and diesel knocking.
- Compute the amount of air required for complete combustion of 1Kg fuel having the composition C = 86%,  $\text{H}_2$  = 12% and rest is ash.
- Define viscosity index (VI) and write its significance.
- Classify refractories based on nature of material and mention one example for each.
- Discuss the possible electronic transitions in UV-Visible region.
- Draw the shapes of d-orbitals.

**Part-B (5 × 8 = 40 Marks)**

- Describe the construction of a metal-metal insoluble electrode and show that its potential depends on anion of insoluble salt. [5]
  - A cell is constructed using Fe and Sn electrodes by placing in their solutions of 0.02M and 0.04M respectively. Write the cell notation and calculate its emf at 25° C ( $E^\circ$  of Fe and Sn are - 0.44V and - 0.18V respectively). [3]
- Illustrate electrochemical corrosion when iron metal contacts with a brine solution. [4]
  - Discuss the method to apply a metal coating on insulator with example. [4]
- Demonstrate hydrodynamic and boundary film lubrication. [5]
  - Explain refractoriness under load (RUL) and thermal spalling of a refractory material. [3]
- Explain the fixed bed catalytic cracking method to convert heavy oil into gasoline. [5]
  - Compute the LCV of a fuel containing C= 88%, H=5.5 %, S= 2%, N= 4% and remaining is Oxygen. [3]
- Draw the splitting of d-orbitals in octahedral and tetrahedral geometry and discuss why CFSE is more in octahedral than in tetrahedral geometry. [3]
  - Write the selection rules and discuss the working principle of IR spectrometer with block diagram and give two applications. [5]
- Discuss the various factors affecting the rate of corrosion. [5]
  - Derive the equation to relate between electrode potential and concentration of a solution. [3]
- Answer any *two* of the following:
  - Define saponification number and write its significance for a good lubricant oil. [4]
  - Choose a method to convert vegetable oil into bio diesel and explain with reaction. [4]
  - Draw the molecular orbital diagram of oxygen molecule and calculate its bond order. [4]