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Code No. : 11024

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. (CBCS) I-Semester Main Examinations, Dec.-2018/Jan.-2019**

**Chemistry-I**

Time: 3 hours

Max. Marks: 60

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

Q.No.	Stem of the question	M	L	CO	PO
<b>Part-A (10 × 2 = 20 Marks)</b>					
1.	Write the notation and electrode reaction of metal-metal insoluble salt type of electrode.	2	2	1	1
2.	Compute the concentration of $Zn^{2+}$ in the solution at 25° C when electrode potential and standard electrode potential of zinc electrode are -0.89V and - 0.76V respectively.	2	3	1	1
3.	When iron and molybdenum metals expose to dry atmosphere their oxides are formed as corrosion products, but further rate of corrosion is different in these two metals-Explain with reason.	2	3	2	1
4.	Define inhibitors and name any two examples.	2	2	2	1
5.	How do you rate the quality of diesel and list the additives to improve it's quality.	2	2	5	1
6.	Compute the LCV of a fuel containing C = 84%, H = 6 %, S = 2%, N = 4%, Ash = 2% and remaining is Oxygen.	2	3	5	1
7.	Define viscosity index (VI) and write its significance in selecting a good lubricant oil.	2	1	4	1
8.	Define thermal spalling and list the measures to control it.	2	2	3	1
9.	Discuss the applications of IR spectra.	2	2	7	1
10.	Differentiate between bonding and anti-bonding molecular orbitals.	2	2	6	1
<b>Part-B (5 × 8 = 40 Marks)</b>					
11. a)	Construct glass electrode and explain the determination of pH of a solution using it with a neat diagram.	5	4	1	1
b)	The emf of following cell is found to be 0.3089V at 25°C. Write the cell reaction and calculate $p^H$ of the solution at 25°C. Pt, Hg, $Hg_2Cl_2(S)$ / $KCl(Satd)$ // $H^+(?)$ , Q, $H_2Q$ / Pt ( $E^0$ of saturated calomel electrode and quinhydrone electrodes are 0.2422V and 0.6994V respectively).	3	3	1	1
12. a)	Illustrate the mechanism of corrosion of iron metal with a labelled diagram when it's surface is partially covered with dust and it is in contact with neutral electrolyte.	4	3	2	1
b)	State the principle of cathodic protection and discuss the protection of underground pipeline by making use of it.	4	2	1	1
13. a)	Define refractoriness and discuss its determination along with significance.	4	2	3	1
b)	Classify the lubricants and explain blended lubricating oils.	4	4	4	1

Contd... 2

14. a)	Why vegetable oils can't be used directly in diesel engines? Suggest and discuss a method to convert vegetable oils into bio-diesel with relevant reaction.	3	3	5	1
b)	Illustrate and explain the method to convert crude oil into its various useful fractions.	5	2	5	1
15. a)	Draw the splitting of d-orbitals in octahedral and tetrahedral geometry and discuss why CFSE is more in octahedral than in tetrahedral geometry.	4	2	6	1
b)	Draw and explain the block diagram of UV spectrometer and write the applications of UV spectra.	4	2	7	1
16. a)	Differentiate between electrochemical and galvanic series.	3	3	1	1
b)	Evaluate the role of nature of metal and the nature of environment in determining the rate of corrosion.	5	5	2	1
17.	Answer any <i>two</i> of the following:				
a)	Discuss hydrodynamic and extreme pressure lubrication.	4	1	4	1
b)	Suggest and discuss two methods to raise the anti-knocking property of gasoline.	4	2	5	1
c)	Write the postulates of molecular orbital theory.	4	2	7	1

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	59%
2	Knowledge on application and analysis (Level-3 & 4)	35%
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	6%

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