University of Mumbai

Curriculum Scheme: Rev2019 ('C' Scheme) 5/7/2022

QP. Code :- 95145 All Programs

Examination: FE Semester II_FH2022

Course Code: FEC203 Course Name: Engineering Chemistry- II

Time: 2hour **Max. Marks: 60**

NOTE: **All Questions are Compulsory.**

Atomic Weights: C = 12, H = 1, O = 16, N = 14, S = 32

I. Multiple Choice Questions:

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry 2 marks each.**
1.	As per the principle of spectroscopy one of the following is the type of energy present in a molecule:
Option A:	Ultrasonic energy.
Option B:	Electronic energy.
Option C:	Solar energy.
Option D:	Geo-thermal energy.
2.	One of the following is an example, explaining principle of green chemistry of Energy efficient chemical synthesis.
Option A:	Synthesis of Carbaryl.
Option B:	Synthesis of Indigo.
Option C:	Synthesis of adipic acid.
Option D:	Synthesis of Benzimidazole.
3.	A cell is constructed from Ni+ 2 / Ni and Cu+2/Cu half cells. The standard potential of the cell is -------. Given E^0Ni = - 0.257 V and E^0Cu = 0.337 V
Option A:	0.594 V.
Option B:	0.008 V.
Option C:	- 0.594 V.
Option D:	- 0.008 V.
4.	Nobel metals do not undergo oxidation corrosion because it forms_____
Option A:	Unstable oxide film.
Option B:	Non-porous oxide film.
Option C:	Porous stable film.
Option D:	Volatile oxide film.
5.	A sample of coal has following composition by mass C =70 %, O = 8 %, H = 10 %, N = 3 %, S = 2%, Ash = 7 %. Calculate H.C.V. using Dulong's formula
Option A:	8277.80 kcal/kg.
Option B:	8805.80kcal/kg.
Option C:	8877.80 kcal/kg.
Option D:	8205.80 kcal/kg.
6.	Coating of tin on iron is an example of ……
Option A:	Anodic coating.
Option B:	Cathodic coating.
Option C:	Galvanizing.
Option D:	Sherardizing.

FE Sem II EC-II

5/7/2022

II. Descriptive Questions:

Q2	Solve any Four Questions out of Six: 4 Marks each
A	Define Spectroscopy. Also explain the origin of spectrum with diagram.
B	The standard emf of the following cell is 0.462 V. $Cu(s)/ Cu^{+2}(aq)(1M)// Ag^{+}(aq)(1M)/ Ag(s)$ Write the cell reaction. If the standard potential of Cu electrode is 0.337 V, wha is the standard potential of Ag electrode?
C	What is the principle of cathodic protection? What are the two types of cathodic protection? Discuss any one with the help of a suitable diagram.
D	Explain how corrosion of iron article takes place in acidic medium.
E	Calculate the percentage atom economy for the following reaction with respect t cinnamaldehyde. $C_6H_5CHO + CH_3CHO \rightarrow C_6H_5CH\text{-}CHCHO + H2O$ Given Atomic Weights: C = 12, H = 1, O = 16.
F	What are 'oxygenates' used in the fuel industry? Where and why are they added? Explain by giving examples.

Q3	Solve any Four Questions out of Six: 4 Marks each
A	Explain the conventional and green route of manufacturing indigo dye. Mention the green chemistry principles involved.
B	What is a Reference electrode? Explain any one Reference electrode with suitable diagram and representation.
C	Give the classification of spectroscopy on atomic and molecular basis (Tree Diagram). Explain the selection rule no.2. $\Delta l = + - 1$ of spectroscopy for electron transitions.
D	By Kjeldahl's method 3 gm of coal sample was analyzed. The ammonia evolved was absorbed in 40 ml of 0.5 N H2SO4. After absorption, the excess H_2SO_4 required 18.5 ml of 0.5N KOH for neutralization. A coal sample was subjected to ultimate analysis 2.45 g of coal on combustion in a Bomb-Colorimeter gave 0.67 of BaSO4. Calculate percentage of Nitrogen and Sulphur.
E	Explain Differential aeration corrosion with diagram and reactions.
F	Calculate the minimum weight and volume of air required for the complete combustion of 1 kg of fuel containing C= 80%, H= 6%, O=8%, S= 1.5%, H2O 1.0%, N= 1.5% and ash= rest. (Molecular weight of air = 28.94 gm).

FE Sem II EC - II 5/7/2022

Q4	Solve any Four Questions out of Six: 4 Marks each
A	How do the following factors affect the rate of corrosion? (i) Relative areas of anodic to cathodic part (ii) Position of metal in galvanic series.
B	Explain the working Catalytic converter with the help of any two chemical reactions and diagram.
C	Give in tabular form the relation between electromagnetic spectrum, types of spectroscopy and corresponding energy changes.
D	What is Biodiesel? Give the trans-esterification reaction of the preparation of Biodiesel and two advantages of biodiesel.
E	Differentiate between Electrolytic and Galvanic cell.
F	Calculate the volume of air required for complete combustion of $1m^3$ of gaseous fuel having the following composition: CO = 5%, C_2H_4 = 10%, CH_4 = 40%, N_2 = 2.5 %, H_2 = 35%, CO_2 = 2%, O_2 = 2.5% Given Atomic Weights: C = 12, H = 1, O = 16, N = 14.