Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS005

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

B.Tech I Semester End Examinations (Regular), December - 2017

Regulations: IARE - R16

ENGINEERING CHEMISTRY

(Common to All Branches)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1.	a)	Define the terms conductance, specific conductance, equivalent conductance, molar conductance and cell constant with their units.	[7M]
	b)	Derive Nernst Equation. Calculate the electrode potential of copper wire dipped in 0.1 M $CuSO_4$ solution at 25^0c.The standard electrode potential of copper is 0.34V.	[7M]
2.	a)	Define Primary and secondary batteries. Explain working principle of Lead-Acid battery with electrode reactions?	[7M]
	b)	What are reference electrodes? Describe the construction and working of calomel electrode.	[7M]

UNIT – II

3.	a)	Explain how nature of corroding environment influences the rate of corrosion?	[7M]
	b)	Discuss corrosion control method of cathodic protection with the help of sacrificial anodic protection.	[7M]
4.	a)	Define Hot Dipping. Explain the method of Galvanization with neat diagram?	[7M]
	b)	What is Paint? Discuss its Constituents and their functions with examples.	[7M]

UNIT – III

5.	a)	Define Priming and Foaming. Explain the formation of Scales and Sludges in boilers?	[7M]
	b)	Distinguish between Temporary and Permanent hardness of water. One liter of water from an underground reservoir in Tirupathi Town in Andhra Pradesh showed the following analysis for its contents: $Mg(HCOO_3)_2$ = 42mg; $Ca(HCO_3)_2$ = 146mg; $CaCl_2$= 71mg;NaOH = 40mg; $MgSO_4$ = 48 mg; organic impurities = 100 mg; Calculate temporary, permanent and total hardness of this sample of 10,000 liters of water.	[7M]
6.	a)	Describe the method of Softening of water by using Ion exchange process.	[7M]
	b)	What is Potable water? Discuss the steps involved in the treatment of Potable water.	[7M]

UNIT – IV

7.	a)	Define polymerization. Explain addition, condensation and co-polymerization with suitable examples?	[7M]
	b)	Differentiate thermo plastic and thermosetting plastics. Write the preparation properties and applications of Nylon-6,6.	[7M]
8.	a)	What is natural rubber? Describe the vulcanization process of rubber with advantages.	[7M]
	b)	What is the composition of Portland cement? Discuss setting and hardening reactions of Portland cement.	[7M]

UNIT – V

9.	a)	Explain the ultimate analysis of coal? a) Carbon and hydrogen b) Nitrogen c) Sulphur d) Oxygen	[7M]
	b)	Define cracking. Explain about Fixed bed catalytic cracking with a neat diagram?	[7M]
10.	a)	Explain the composition, properties and applications of LPG and CNG?	[7M]
	b)	Distinguish between Gross calorific value and Net calorific value Calculate the minimum amount of air required for complete combustion of 1 kg of 0coal sample having the following compositions: C=80%, S=2%, H=5%, N=1% and ash = 4% Oxygen in air is 23% by weight.	[7M]

COURSE OBJECTIVES (COs):

The course should enable the students to:

I	Apply the electrochemical principles in batteries.
II	Understand the fundamentals of corrosion and development of different techniques in corrosion control.
III	Analysis of water for its various parameters and its significance in industrial applications.
IV	Improve the fundamental science and engineering principles relevant to materials.

COURSE LEARNING OUTCOMES (CLOs):

Students, who complete the course, will have demonstrated the asking to do the following:

CAHS005.01	Extrapolate the knowledge of electrolytic cell, electrochemical cell, electrode potential and reference electrodes.
CAHS005.02	Use of primary and secondary batteries in various fields such as automobiles, railways, medical devices, aircrafts and day to day life.
CAHS005.03	Explain the characteristic factors of a metal and environment influencing the rate of corrosion.
CAHS005.04	Use appropriate methods such as protective, metallic and organic coatings to control corrosion in metals.
CAHS005.05	Evaluate the quality and utility of suitable water for industrial as well as domestic applications.
CAHS005.06	Use innovative methods to improve the quality of soft water for Potable and industrial purpose at cheaper cost.
CAHS005.07	Understand the basic principles of polymers to overcome real-time problems.
CAHS005.08	Demonstrate the ability to use polymeric materials for engineering problems in different domains.
CAHS005.09	Justify the immense importance of basic constructional material, Portland cement in Civil Engineering works
CAHS005.10	Describe various instruments used for measuring various properties of lubricants in industries.
CAHS005.11	Understand refractory use in metallurgical furnaces, kilns and other equipments.
CAHS005.12	Demonstrate comprehensive knowledge of conventional fuel properties on engine performance.
CAHS005.13	Understand the importance of cracking, knocking in IC engines and operations involved in petroleum refining.
CAHS005.14	Describe the physical and chemical properties of alternate fuels like natural gas, LPG and CNG.
CAHS005.15	Determine efficiency of the fuel in terms of calorific value and combustion reactions of the fuel.

MAPPING OF SEMESTER END EXAMINATION (SEE) TO COURSE LEARNING OUTCOMES (CLOs):

SEE Question No.		Course Learning Outcomes (CLOs)		Blooms Taxonomy Level
1	a	CAHS005.01	Extrapolate the knowledge of electrolytic cell, electrochemical cell, electrode potential and reference electrodes.	Understand
	b	CAHS005.01	Extrapolate the knowledge of electrolytic cell, electrochemical cell, electrode potential and reference electrodes.	Understand
2	a	CAHS005.02	Use of primary and secondary batteries in various fields such as automobiles, railways, medical devices, aircrafts and day to day life.	Understand
	b	CAHS005.01	Extrapolate the knowledge of electrolytic cell, electrochemical cell, electrode potential and reference electrodes.	Understand
3	a	CAHS005.03	Explain the characteristic factors of a metal and environment influencing the rate of corrosion.	Remember
	b	CAHS005.04	Use appropriate methods such as protective, metallic and organic coatings to control corrosion in metals.	Remember
4	a	CAHS005.04	Use appropriate methods such as protective, metallic and organic coatings to control corrosion in metals.	Remember
	b	CAHS005.04	Use appropriate methods such as protective, metallic and organic coatings to control corrosion in metals.	Remember
5	a	CAHS005.05	Evaluate the quality and utility of suitable water for industrial as well as domestic applications.	Remember
	b	CAHS005.05	Evaluate the quality and utility of suitable water for industrial as well as domestic applications.	Remember
6	a	CAHS005.06	Use innovative methods to improve the quality of soft water for Potable and industrial purpose at cheaper cost.	Understand
	b	CAHS005.06	Use innovative methods to improve the quality of soft water for Potable and industrial purpose at cheaper cost.	Understand
7	a	CAHS005.07	Understand the basic principles of polymers to overcome real-time problems.	Remember
	b	CAHS005.08	Demonstrate the ability to use polymeric materials for engineering problems in different domains.	Understand
8	a	CAHS005.08	Demonstrate the ability to use polymeric materials for engineering problems in different domains.	Understand
	b	CAHS005.09	Justify the immense importance of basic constructional material, Portland cement in Civil Engineering works	Understand
9	a	CAHS005.12	Demonstrate comprehensive knowledge of conventional fuel properties on engine performance.	Remember
	b	CAHS005.13	Understand the importance of cracking, knocking in IC engines and operations involved in petroleum refining.	Understand
10	a	CAHS005.14	Describe the physical and chemical properties of alternate fuels like natural gas, LPG and CNG.	Remember
	b	CAHS005.15	Determine efficiency of the fuel in terms of calorific value and combustion reactions of the fuel.	Understand

Signature of Course Coordinator **HOD, FRESHMAN ENGINEERING**