



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad-500043

FRESHMAN ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	Engineering Chemistry
Course Code	:	AHS005
Class	:	I B. Tech I Semester
Branch	:	Common for all branches
Year	:	2017- 2018
Course Coordinator	:	Mr. Praveen, Assistant Professor
Course Faculty	:	Dr. P Ramakanth, Professor Dr. C Mahendar, Professor Ms. V Anitha Rani, Associate Professor Mr. B Raju, Assistant Professor Ms. M Malathi, Assistant Professor Mr. G Mahesh Kumar, Assistant Professor Ms. T Mallika, Assistant Professor Mr. V Taraka Rama Rao, Assistant Professor Ms. M Lakshmi Prasanna, Assistant Professor Ms. P Sarvatra, Assistant Professor Ms. M Swathi, Assistant Professor

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.

TUTORIAL QUESTION BANK

UNIT – I			
ELECTROCHEMISTRY AND BATTERIES			
Part – A (Short Answer Questions)			
S.NO	QUESTIONS	Blooms Taxonomy Level	Course Learning Outcomes (CLOs)
1	What are conductors? Differentiate metallic conductors from electrolytic conductors.	Understand	CAHS005.01
2	Define the terms conductance and cell constant with its units.	Understand	CAHS005.01
3	Define the specific conductance of an electrolyte. How does it vary with dilution?	Understand	CAHS005.01
4	What is equivalent conductance of an electrolyte? Mention its units.	Understand	CAHS005.01
4	Define molar conductance of an electrolyte and mention its units.	Understand	CAHS005.01
5	Why specific conductance of an electrolyte decreases where as equivalent conductance increases on dilution?	Understand	CAHS005.01
6	What is single electrode potential? How do you determine the electrode potential of Zn/ZnSO ₄ ?	Understand	CAHS005.01
7	Write oxidation and reduction reactions of a Daniel cell.	Understand	CAHS005.01
8	What is EMF of a galvanic cell? How to represent a galvanic cell.	Understand	CAHS005.01
9	What are the functions of a salt bridge in a galvanic cell?	Understand	CAHS005.01
10	Define electrochemical series and write its applications?	Understand	CAHS005.01
11	Write Nernst equation for the calculation of electrode potential.	Understand	CAHS005.01
12	Describe the construction of calomel electrode with a neat diagram.	Understand	CAHS005.01
13	Write the advantages and limitations of quinhydrone electrode.	Understand	CAHS005.01
14	Define batteries. How are they classified?	Understand	CAHS005.02
15	Discuss the working principle of dry cell or leclanche cell and write its applications.	Understand	CAHS005.02
16	Differentiate between Primary and Secondary cells with suitable examples.	Understand	CAHS005.02
17	Mention the applications of lead-acid and nickel-cadmium batteries.	Understand	CAHS005.02
18	Why does a dry cell become dead after sometime even though it is not used?	Understand	CAHS005.02
19	What is a rechargeable battery? Give two examples.	Understand	CAHS005.02

20	Write the discharging and charging reactions of a lead acid battery.	Understand	CAHS005.02
Part - B (Long Answer Questions)			
1	Define specific, equivalent and molar conductance with their units and write a note on effect of dilution on specific conductance and equivalent conductance.	Understand	CAHS005.01
2	What is Galvanic cell? Explain the construction of Galvanic cell with electrode reactions.	Understand	CAHS005.01
3	Why the anode of galvanic cell is negative and cathode is positive? Write the different electrode reactions occur at the electrode.	Understand	CAHS005.01
4	What is an electrochemical series? Give its various applications with suitable examples.	Understand	CAHS005.01
5	Derive Nernst equation. Explain how it can be utilized to find the emf of an electrolyte concentration cell?	Understand	CAHS005.01
6	Explain the construction of calomel electrode. How the potential of calomel electrode vary with concentration of KCl?	Understand	CAHS005.01
7	What are reference electrodes? Explain the construction and working of Quinhydrone electrode?	Understand	CAHS005.01
8	Explain about the construction and discharging reactions of dry cell.	Understand	CAHS005.02
9	Explain the construction and working of lead-acid battery. Write the discharging, charging reactions and limitations of lead acid battery?	Understand	CAHS005.02
10	Describe the construction of Ni-Cd battery with relevant reactions occurring during the discharging and charging. Mention its applications.	Understand	CAHS005.02
11	Differentiate between primary and secondary cells. Describe the construction and working of dry cell with a neat diagram.	Understand	CAHS005.02
Part - C (Analytical Questions)			
1	When zinc rod is dipped in a solution of aqueous copper sulphate, copper is precipitated out. Why?	Understand	CAHS005.01
2	Calculate the EMF of a cell if the oxidation and reduction potentials of the cell are -0.763V and 0.337V.	Understand	CAHS005.01
3	Calculate the electrode potential of the copper wire dipped in 0.1 M CuSO ₄ solution at 25 ^o c. The standard electrode potential of copper is 0.34 V.	Understand	CAHS005.01
4	Specific conductance of a decinormal solution of KCl is 0.0112 ohm ⁻¹ cm ⁻¹ and the resistance of a cell containing the solution was found to be 56 Ohms. What is cell constant?	Understand	CAHS005.01
5	The equivalent conductance of 0.005N NaOH solution is 240 mho cm ² equiv ⁻¹ . What is specific conductance and electrical resistance, if the electrodes are 1 cm apart and each have a surface area of 1 cm ² ?	Understand	CAHS005.01
6	The resistance of 0.1N solution of an electrolyte is 40 Ohms. If the distance between the electrodes is 1.2 cm and area of cross- section is 2.4 cm ² , Calculate equivalent conductance of the electrolyte.	Understand	CAHS005.01
7	A solution of salt (1.0N) surrounding two platinum electrodes 2.1 cm apart and 4.2 cm ² in area was found to offer a resistance of 50 ohms. Calculate the equivalent conductance of the electrolyte.	Understand	CAHS005.01
8	A conductance cell has two parallel electrodes of 1.25 sq cm area placed 10.5 cm apart; when filled with an electrolyte solution, the resistance of the cell was found to be 1995 ohms. Calculate cell constant and specific conductance the cell.	Understand	CAHS005.01
9	Calculate the e.m.f of voltaic cell Fe Fe ²⁺ (aq) Cu ²⁺ (aq) Cu. Given the electrode potentials of copper and iron are 0.34 volt and -0.44 volt respectively.	Understand	CAHS005.01
10	The standard reduction potentials of Zn ⁺² /Zn and Cu ⁺² /Cu are -0.76V and +0.34 V respectively. What is the e.m.f of the cell? Zn ⁺² (0.05M)/Zn //Cu ⁺² (0.005M) Cu.	Understand	CAHS005.01
UNIT - II			
CORROSION AND ITS CONTROL			
Part – A (Short Answer Questions)			
1	Define corrosion of metals. Write any two causes and disadvantages of corrosion.	Remember	CAHS005.03
2	What is metal oxide film? Formation of which type of metal oxide film causes	Remember	CAHS005.03

	rapid and continuous corrosion.		
3	Mention three metals, whose specific volume ratios of their oxides is greater than that of metals.	Remember	CAHS005.03
4	How corrosion takes place by different gases? Give examples.	Remember	CAHS005.03
5	What is meant by rusting of iron? Explain about absorption of oxygen type corrosion.	Remember	CAHS005.03
6	Differentiate between dry corrosion and wet corrosion.	Remember	CAHS005.03
7	Explain the effects of the following factors on the rate of corrosion: i. p^H ii. Humidity in air iii. Conductance of corroding medium.	Remember	CAHS005.03
8	Explain the effects of the following factors on the rate of corrosion: i. Position in galvanic series ii. Relative area of anode and cathode iii. Nature of oxide film.	Remember	CAHS005.03
9	Explain how overvoltage influences the rate of corrosion in metals.	Remember	CAHS005.03
10	Discuss about anodic and cathodic coatings on the surface of metals to protect from corrosion.	Remember	CAHS005.04
11	What is cathodic protection? Explain sacrificial anodic protection method.	Remember	CAHS005.04
12	What is hot dipping? Give the importance of tinning in corrosion control.	Remember	CAHS005.04
13	Distinguish between galvanizing and tinning. Mention its applications.	Remember	CAHS005.04
14	What is the impressed current cathodic protection?	Remember	CAHS005.04
15	Why does corrosion of water filled steel tanks occur below the waterline?	Remember	CAHS005.04
16	How does liquid metal corrosion occur in metals?	Remember	CAHS005.04
17	What is crevice corrosion? Give two examples.	Remember	CAHS005.04
18	What is paint? Give three functions of fillers in paint.	Remember	CAHS005.04
19	Why drying oils are used in paints? Give three functions of drying oils.	Remember	CAHS005.04
20	Mention two functions of driers and plasticizers in paint.	Remember	CAHS005.04
Part - B (Long Answer Questions)			
1	Describe the mechanism of hydrogen evolution type corrosion and oxygen absorption type corrosion with a neat diagram.	Remember	CAHS005.03
2	What is oxidation corrosion and how does it takes place? Describe the mechanism of oxidation corrosion?	Remember	CAHS005.03
3	Explain how nature of corroding environment influences the rate of corrosion in metals?	Remember	CAHS005.03
4	Discuss how nature of metal influences the rate of corrosion in metals?	Remember	CAHS005.03
5	Explain about waterline corrosion and crevice corrosion with a neat diagram.	Remember	CAHS005.03
6	Discuss the role of nature of oxide film formed in oxidation corrosion. State and explain Pilling- Bed worth rule.	Remember	CAHS005.03
7	Describe the process of galvanization. How does it prevent the corrosion of iron and mention its applications.	Remember	CAHS005.04
8	Explain the process of tinning. How does it prevent the corrosion of iron and mention its applications.	Remember	CAHS005.04
9	Describe the process of electroplating of copper and write the advantages of electroplating.	Remember	CAHS005.04
10	What is paint? What are the different constituents of paint and explain their functions.	Remember	CAHS005.04
11	Write in brief on impressed current method of controlling corrosion with a neat diagram.	Remember	CAHS005.04
12	What is cathodic protection? Explain sacrificial anodic protection method of controlling corrosion.	Remember	CAHS005.04
Part - C (Analytical Questions)			
1	Rusting of iron is faster in saline water than in ordinary water. Why?	Remember	CAHS005.03
2	Iron does not rust if the zinc coating is broken in a galvanized iron pipe, but rusting occurs much faster if the tin coating over iron is broken. Explain.	Remember	CAHS005.03
3	Iron corrodes faster than aluminium, even though iron is placed below aluminium	Remember	CAHS005.03

	in the electrochemical series. Why?		
4	Impure metal corrodes faster than pure metal under identical conditions. Why?	Remember	CAHS005.03
5	Small anodic area results in intense corrosion. Why?	Remember	CAHS005.03
6	Why does a steel pipe in a large copper tank corrode and causing rapid destruction?	Remember	CAHS005.04
7	Galvanized container is not used for storage of food products, but tin coated containers are used. Comment on the statement.	Remember	CAHS005.04
8	How is cathodic protection of iron different from its galvanisation?	Remember	CAHS005.04
9	Mention three functions of pigment and thinner of paint.	Remember	CAHS005.04
10	What are the different reactions taking place at the cathode during corrosion? How do cathodic inhibitors work to reduce the rate of these reactions?	Remember	CAHS005.04

UNIT-III

WATER TECHNOLOGY

Part – A (Short Answer Questions)

1	What is hard water? Give the disadvantages of hard water in domestic requirements.	Remember	CAHS005.05
2	Differentiate between temporary and permanent hardness of water. Discuss in detail the various units of hardness.	Remember	CAHS005.05
3	What is the basic principle involved in estimation of hardness of water by EDTA method?	Remember	CAHS005.05
4	Discuss problems associated with using hard water in boilers. How can the scales be removed?	Remember	CAHS005.05
5	Define the following units used to express hardness of water: i. Ppm ii. mg/l iii. Degree French iv. Degree Clark	Remember	CAHS005.05
6	Describe the causes and harmful effects of sludge formation in boilers.	Remember	CAHS005.05
7	What is priming and how it is formed? Give the disadvantages of priming.	Remember	CAHS005.05
8	What is the basic principle of Winkler's method for the determination of dissolved oxygen?	Remember	CAHS005.05
9	What is foaming and how it is formed? Give the disadvantages of foaming.	Remember	CAHS005.05
10	What are the salts responsible for the temporary and permanent hardness of water?	Remember	CAHS005.05
11	Distinguish between hard water and soft water. What is meant by softening of water?	Remember	CAHS005.05
12	How is natural water sterilised by chlorine and bleaching powder?	Understand	CAHS005.06
13	Discuss break point of chlorination in treatment of potable water.	Understand	CAHS005.06
14	Write about calgon conditioning in internal treatment of boiler feed water.	Understand	CAHS005.06
15	Distinguish between zeolite and ion exchange process.	Understand	CAHS005.06
16	What is reverse osmosis? Describe reverse osmosis method of desalination of brackish water.	Understand	CAHS005.06
17	Write the advantages and disadvantages of zeolite process.	Understand	CAHS005.06
18	Write about phosphate conditioning of water to overcome the boiler troubles.	Understand	CAHS005.06
19	What is potable water? Write the specifications of potable water.	Understand	CAHS005.06
20	How exhausted ion-exchange resins are regenerated?	Understand	CAHS005.06

Part – B (Long Answer Questions)

1	Explain the following: i. Why do we express hardness of water in terms of CaCO ₃ equivalent? ii. Why buffer is added during the determination of hardness of water using EDTA? iii. Why hard water fails to produce lather with soap solution?	Remember	CAHS005.05
2	Write the experimental procedure for the determination of total hardness by EDTA method.	Remember	CAHS005.05

3	Explain the formation of scales in boilers and how are they different from sludges? Mention their bad effects in boilers.	Remember	CAHS005.05
4	What do you understand by priming and foaming problems in boilers?	Remember	CAHS005.05
5	Explain the process of sludge formation in boilers. How it is removed?	Remember	CAHS005.05
6	Explain the basic principle involved in estimation of dissolved oxygen by Winkler's method.	Remember	CAHS005.05
7	List the salts responsible for temporary hardness and permanent hardness. Mention the disadvantages of using hard water for domestic and industrial purpose.	Remember	CAHS005.05
8	What is caustic embrittlement and how can you prevent caustic embrittlement in boilers.	Remember	CAHS005.05
9	Explain Zeolite process of softening hard water with a neat diagram and mention its advantages.	Understand	CAHS005.06
10	Describe Ion-Exchange method of demineralization of water. Mention the advantages over zeolite method.	Understand	CAHS005.06
11	What is meant by sterilisation of water? Explain how sterilization of water is carried by chlorination and ozonation.	Understand	CAHS005.06
12	Explain the reverse osmosis process with a neat labelled diagram. Mention its advantages.	Understand	CAHS005.06
13	Explain the following internal treatment methods: i. Carbonate conditioning ii. Calgon conditioning iii. Phosphate conditioning	Understand	CAHS005.06
Part – C (Analytical Questions)			
1	Compare and contrast the temporary and permanent hardness of water	Remember	CAHS005.05
2	Why do we add buffer solution during estimation of hardness of water by EDTA method?	Remember	CAHS005.05
3	What happens when temporary hard water is boiled? Give reactions.	Remember	CAHS005.05
4	How caustic embrittlement can be controlled by adding sodium sulphate to boiler feed water?	Remember	CAHS005.05
5	One liter of water sample collected from a water source in Telangana has shown the Following analysis. Mg (HCO ₃) =14.6 mg, MgSO ₄ =12 mg, Ca (HCO ₃) ₂ =16.2 mg, CaCl ₂ =22.2 mg, MgCl ₂ =9.5 mg and organic impurities 100 mg. Calculate temporary and permanent hardness in Degree French.	Remember	CAHS005.05
6	One liter of water from an underground reservoir in Tirupathi Town in Andhra Pradesh showed the following analysis for its contents: Mg(HCO ₃) ₂ =42 mg; Ca(HCO ₃) ₂ =146 mg; CaCl ₂ =71 mg; MgSO ₄ =48 mg; Calculate temporary, permanent and total hardness of this sample of 10,000 liter of water.	Remember	CAHS005.05
7	A sample of hard water contains the following dissolved salts per liter. Mg(HCO ₃) ₂ =14.6mgs; Ca(HCO ₃) ₂ =16.2mgs; CaCl ₂ =111mgs; CaSO ₄ =1.36 mgs; silica=40 mgs; Turbidity=10 mgs. Calculate the temporary, permanent and total hardness of water in ppm, degree clark and degree french.	Remember	CAHS005.05
8	Calculate temporary and permanent hardness of a water sample which contains 6.8mg of CaSo ₄ , 33mg of CaCl ₂ , 40mg of Na ₂ SO ₄ , 24mg of MgSO ₄ per liter of the water sample. (Given Molar mass of Ca=40g,Na=23g,Mg=24g,S=32g,O=16g,Cl=35g)	Remember	CAHS005.05
9	A sample water of 100 ml required 12.6 ml of 0.02M EDTA solution with EBT as indicator and 8.4 ml of 0.02 M EDTA for the same volume of water after removing the carbonate hardness. Calculate the total, permanent hardness in terms of calcium carbonate equivalents.	Remember	CAHS005.05
10	Why is water softened by Zeolite process unfit for use in boilers?	Understand	CAHS005.06
11	Calgon treatment prevents scale formation in boilers. Why?	Understand	CAHS005.06

12	Explain why Na_3PO_4 is selected as the best reagent in internal treatment of water by phosphate conditioning.	Understand	CAHS005.06
UNIT-IV			
MATERIALS CHEMISTRY			
Part – A (Short Answer Questions)			
1	What are polymers? Differentiate between homopolymer and copolymer with examples.	Remember	CAHS005.07
2	Write any two examples for addition and condensation polymerisation with their respective monomers.	Remember	CAHS005.07
3	Differentiate between addition polymerisation and condensation polymerisation with examples.	Remember	CAHS005.07
4	What are plastics? Differentiate between thermoplastics and thermosetting plastics.	Remember	CAHS005.07
5	Write the properties of poly vinyl chloride and Nylon 6:6.	Understand	CAHS005.08
6	Mention the properties and applications of Bakelite.	Understand	CAHS005.08
7	Write the synthesis and engineering applications of following polymers: i. Thiokol rubber ii. Buna-S rubber	Understand	CAHS005.08
8	Mention preparation method and uses of following polymers: i. PVC ii. Nylon 6:6	Understand	CAHS005.08
9	What are the functions of plasticizers and fillers in compounding of plastics?	Remember	CAHS005.07
10	Write the properties and applications of polyester.	Understand	CAHS005.08
11	What is natural rubber? Write the disadvantages of natural rubber.	Remember	CAHS005.07
12	Explain why natural rubber needs vulcanization and how it is carried out?	Remember	CAHS005.07
13	What is a lubricant? Write the classification of lubricants.	Remember	CAHS005.10
14	What is the composition of Portland cement? Write the disadvantage if excess lime is added to cement.	Understand	CAHS005.09
15	Write the chemical reactions that takes place during setting of cement.	Understand	CAHS005.09
16	What are the characteristics of a good fiber?	Remember	CAHS005.07
17	What are viscosity and viscosity index of lubricant oil?	Remember	CAHS005.10
18	What are the characteristics of a good lubricant?	Remember	CAHS005.10
19	Define flash and fire point of a lubricant by Penskey Marten's method.	Remember	CAHS005.10
20	What are refractories? Classify the refractories with example.	Understand	CAHS005.11
Part – B (Long Answer Questions)			
1	Explain different types of polymerisation reactions with examples.	Remember	CAHS005.07
2	What is meant by compounding of plastics? Explain the role of ingredients used in compounding of plastics.	Remember	CAHS005.07
3	Write the synthesis, properties and engineering applications of the following: i. Nylon-6:6 ii. Polyvinyl chloride	Understand	CAHS005.08
4	Describe the preparation, properties and engineering applications of Bakelite.	Understand	CAHS005.08
5	Explain the vulcanization of rubber. What are the advantages of vulcanized rubber?	Remember	CAHS005.07
6	What are elastomers? Give the preparation, properties and applications of Buna-S and Thiokol rubber.	Understand	CAHS005.08
7	Explain the mechanism of setting and hardening of cement with chemical reactions.	Understand	CAHS005.09
8	Describe the flash point, fire point, cloud point and pour point of a lubricant with a neat diagram.	Remember	CAHS005.10
9	Distinguish between : i. Thermoplastics and thermosetting plastics with examples. ii. Addition polymerisation and condensation polymerisation with examples.	Remember	CAHS005.07
10	Explain the classification of refractories with examples.	Understand	CAHS005.11
11	What are fibers and how they are classified? Give an account of the fiber	Remember	CAHS005.07

	reinforced plastics.		
Part - C (Analytical Questions)			
1	Why cannot thermosetting plastics be reused and reshaped?	Remember	CAHS005.07
2	PVC is soft and flexible whereas Bakelite is hard and brittle. Why?	Remember	CAHS005.07
3	Why does rubber become stiff on stretching?	Remember	CAHS005.07
4	Why is Teflon highly chemical resistant?	Remember	CAHS005.07
5	Natural rubber needs vulcanization. Why?	Remember	CAHS005.07
6	Why Thiokol rubber cannot be vulcanized?	Remember	CAHS005.07
7	Why plasticizer is used during moulding of plastics?	Remember	CAHS005.07
8	What are the functions of lubricants and catalysts in compounding of plastics?	Remember	CAHS005.07
9	What should be the flash point of a good lubricant?	Remember	CAHS005.10
10	What is the significance of determining the pour point of a lubricant?	Remember	CAHS005.10
UNIT-V			
FUELS AND COMBUSTION			
Part - A (Short Answer Questions)			
1	Define a fuel and write the classification of the fuels with suitable examples.	Remember	CAHS005.12
2	What is meant by calorific value of a fuel? Mention its units.	Understand	CAHS005.15
3	Distinguish between gross and net calorific value of a fuel.	Understand	CAHS005.15
4	Write any two significances of proximate analysis and ultimate analysis of a coal.	Remember	CAHS005.12
5	How nitrogen is determined by ultimate analysis of a coal?	Remember	CAHS005.12
6	What are the different types of fuels? Give the characteristics of a good fuel.	Remember	CAHS005.12
7	What is cracking of petroleum? Give the advantages of catalytic cracking of petroleum.	Understand	CAHS005.13
8	Describe fixed bed catalytic cracking process with a neat diagram.	Understand	CAHS005.13
9	What is meant by knocking in IC engine? Why ethylene dibromide is added to petrol.	Understand	CAHS005.13
10	What is CNG? Give the composition and applications of CNG.	Remember	CAHS005.14
11	What are the various fractions obtained during refining of petroleum?	Understand	CAHS005.13
12	Mention the advantages and disadvantages of solid, liquid and gaseous fuels.	Remember	CAHS005.12
13	Write n-octane, naphthalene and iso-octane in the increasing order of their knocking tendency.	Understand	CAHS005.13
14	What is a natural gas? Give the composition and applications of natural gas.	Remember	CAHS005.14
15	What is LPG? Give its composition and applications.	Remember	CAHS005.14
16	Distinguish between octane number and cetane number.	Understand	CAHS005.13
17	Write any one anti-knocking agent added to petrol and explain how it works.	Understand	CAHS005.13
18	How sulphur compounds are eliminated from crude oil?	Understand	CAHS005.13
19	Why it is necessary to remove sulphur from oil and natural gas?	Understand	CAHS005.13
20	What is combustion? Write the combustion reactions for carbon and hydrogen.	Understand	CAHS005.13
Part - B (Long Answer Questions)			
1	What are fuels? Give complete classification of fuels with examples.	Remember	CAHS005.12
2	Explain the proximate analysis of coal. i. Moisture ii. Volatile matter iii. Ash content iv. Fixed carbon.	Remember	CAHS005.12
3	Define knocking. How it is related to octane number and gives the importance of TEL as an antiknocking agent?	Understand	CAHS005.13
4	Explain how the percentage of carbon, hydrogen, sulphur and oxygen is estimated by ultimate analysis of coal.	Remember	CAHS005.12
5	Explain the refining of petroleum by giving its composition, boiling ranges and uses of various fractions obtained during refining.	Understand	CAHS005.13
6	Explain the composition, properties and applications of LPG and CNG.	Remember	CAHS005.14
7	Explain the ultimate analysis of coal. i. Carbon and hydrogen ii. Nitrogen	Remember	CAHS005.12

	iii. Sulphur iv. Oxygen		
8	What is octane number and cetane number? Explain their significances.	Understand	CAHS005.13
9	What is cracking? Explain about Fixed bed catalytic cracking with a neat diagram.	Understand	CAHS005.13
10	What is a crude oil? Write a short note on refining of petroleum with various fractions obtained during refining and mention uses of each fraction.	Understand	CAHS005.13
Part - C (Analytical Questions)			
1	Arrange wood, peat, lignite, bituminous and anthracite coal in increasing order of their carbon and moisture content.	Remember	CAHS005.12
2	List the various steps involved in refining of petroleum. At what temperature kerosene, diesel and gasoline are obtained. How do they differ in their composition?	Understand	CAHS005.13
3	What is the importance of determining fixed carbon in coal?	Remember	CAHS005.12
4	Gasoline containing TEL used in internal combustion engines. Why?	Understand	CAHS005.13
5	Why a good fuel should possess low oxygen and high carbon percentage?	Remember	CAHS005.12
6	Why is net calorific value less than gross calorific value?	Understand	CAHS005.15
7	Calculate the minimum amount of air required for complete combustion of 1kg of coal sample having the following compositions: C=80%, S=2%, H=5%, O = 3%, N=1% and ash=4%.Oxygen in air is 23% by weight.	Understand	CAHS005.15
8	A sample of coal was found to have the following percentage composition: C=75%, S=1.2%, H=5.2%, N=3.7%, O=12.8% and ash=2.1%. Oxygen in air is 23% by weight. Calculate the minimum amount of air required for complete combustion of 1kg of coal sample.	Understand	CAHS005.15
9	Calculate the gross and net calorific values of a coal sample having the following composition Carbon=80%, Hydrogen=7%, Oxygen=3%, Sulphur=3.5%, Nitrogen=2% and Ash=5%.	Understand	CAHS005.15
10	A sample of coal contains the following composition Carbon=84%, Hydrogen=12%, Oxygen=2%, Sulphur =1% and the remainder being ash. Calculate the gross and net calorific values of the fuel.	Understand	CAHS005.15

Prepared By: Mr. M Praveen, Assistant Professor
Ms. V Anitha Rani, Associate Professor
Mr. B Raju, Assistant Professor
Ms. M Malathi, Assistant Professor

HOD, FRESHMAN ENGINEERING