



B.E. DEGREE EXAMINATIONS: JUNE 2017

(Regulation 2015)

Second Semester

U15CHT202: APPLIED CHEMISTRY

(Common to AE / AUE / ME / MCE)

COURSE OUTCOMES

CO1: Classify the different types of fuels and their properties

CO2: Categorize the engineering materials and their uses

CO3: Defend the Corrosion problems

CO4: Design a water purifier

CO5: Identify the techniques of preparing metal powder

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match list I with list II and select the correct answer using the codes given below

CO2 [K₂]

List I		List II	
A. Corrosion		i. Refractory	
B. Thermal spalling		ii. Abrasives	
C. Aniline point		iii. Anode	
D. Emery		iv. Lubricants	

- | | A | B | C | D |
|----|-----|----|----|-----|
| a) | iv | i | ii | iii |
| b) | iii | i | iv | ii |
| c) | ii | iv | i | iii |
| d) | iv | ii | i | iii |

2. The following metal oxide layer which is volatile in nature is ----

CO3 [K₂]

- | | |
|-----------------------------------|--------|
| a) MoO ₃ | b) CuO |
| c) Al ₂ O ₃ | d) AgO |

3. Which of the following statements are correct regarding fuels?

CO1 [K₃]

- | | |
|---|--------------------|
| i. Cracking improves the quality of a gasoline | |
| ii. The calorific value of natural gas is greater than water gas | |
| iii. Octane number is used to find the quality of a diesel engine fuel | |
| iv. Bituminous coal is used for the manufacturing of metallurgical coke | |
| a) (i) (ii) (iii) | b) (ii) (iii) (iv) |
| c) (i) (ii) (iv) | d) (i) (iii) (iv) |

10. Condensed Phase rule is ---- CO5 [K₁]
- a) $F = C - P + 2$ b) $F = C - P - 1$
- c) $F = C - P - 2$ d) $F = C - P + 1$

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Differentiate between gross and net calorific values. CO1 [K₃]
12. Explain the importance of spontaneous ignition temperature of a fuel. CO1 [K₃]
13. Write the synthesis of silicon carbide and boron carbide. CO2 [K₂]
14. Cloud point and pour point of a lubricating oil should be low - justify CO2 [K₄]
15. Distinguish chemical corrosion from electrochemical corrosion. CO3 [K₃]
16. List the factors influencing the corrosion of a metal. CO3 [K₃]
17. Define caustic embrittlement. CO4 [K₂]
18. Explain the colloidal conditioning in water softening process. CO4 [K₂]
19. State the advantages of powder metallurgy CO5 [K₂]
20. Find the number of phases and component of the following system: CO5 [K₄]
- $\text{Ice}_{(s)} \leftrightarrow \text{Water}_{(l)} \leftrightarrow \text{Water vapor}_{(g)}$

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Enumerate the various steps carried out during the purification of river water by the municipal supply board to provide potable water and the process by which super chlorination is prevented during sterilization process. CO4 [K₃]
22. (i) Explain the determination of hydrogen, nitrogen, sulphur and oxygen in a coal sample by ultimate analysis. (7) CO1 [K₃]
- (ii) Describe the manufacturing of metallurgical coke by Otto-Hoffman by-product method with a neat diagram. (7) CO1 [K₂]
23. (i) Classify refractories with examples and describe the general processes involved in the manufacturing of refractories. (7) CO2 [K₂]
- (ii) Explain the following properties of a lubricant with its significance (7) CO2 [K₂]
- a) Viscosity Index b) Flash point and fire point

24. (i) Illustrate with a diagram the mechanism of corrosion of an iron structure partially dipped in dilute hydrochloric acid and explain using sacrificial anodic method the control of corrosion of iron structures. (7) CO3 [K₃]
- (ii) Identify the important constituents of paint and discuss the functions of them with examples. (7) CO3 [K₂]
25. (i) Describe the process of removal of calcium and magnesium salts from boiler feed water in an industry using ion exchange resins. (7) CO4 [K₃]
- (ii) Explain with reactions how the presence of dissolved oxygen, CO₂, and salts in boiler feed water cause boiler corrosion and elucidate the control measures to avoid boiler corrosion. (7) CO4 [K₃]
26. (i) Draw and interpret the phase diagram of lead silver alloy system and explain Pattinson's process. (7) CO5 [K₄]
- (ii) Describe the methods for the preparation of metal powder in powder metallurgy process. (7) CO5 [K₂]
- 27 (i) Describe the analysis of flue gas using Orsat's apparatus in order to determine the efficiency of combustion of coal. (7) CO1 [K₃]
- (ii) Elaborate on the preparation and applications of high alumina bricks and magnesite bricks. (7) CO5 [K₂]
