CY3151 ENGINEERING CHEMISTRY

IMPORTANT QUESTIONS AND QUESTION BANK

UNIT I WATER AND ITS TREATMENT

2-Marks

1. Define hardness of water?
2. What are the salts responsible for carbonate and non-carbonate hardness of water?
3. Distinguish between hard and soft water.
4. Why is water softened before using in boilers?
5. What are scales and sludges?
6. Mention any two compounds that cause caustic embrittlement in boilers?
7. What is meant by priming and foaming? How can they be prevented?
8. What is Calgon conditioning? How it is functioning to water treatment?
9. What is colloidal conditioning?
10. What are ion-exchange resin?

13-Marks

1. How is internal treatment of boiler feed water carried out using phosphate and Calgon conditioning? (8marks)
2. What are boiler troubles? How are they caused? Suggest steps for minimizing the boiler troubles? (or) Explain the boiler troubles, “scales and sludges” in details. (8marks)
3. Describe the process of demineralization of hardwater using ion-exchange resins. (16marks)
4. How is the exhausted resin regenerated in an ion-exchange method? What are the merits and demerits of ion-exchange method? (16marks)
5. Explain the disadvantages of scales formation? (8marks)
6. Explain briefly about boiler feed water and its requirements. (8marks)
7. Write short notes on: a) Boiler compounds b) Caustic embrittlement(8marks)
8. Explain internal conditioning of boiler feed water. (8marks)
9. Define desalination. Explain the reverse osmosis process of desalination of water (or) What is reverse osmosis? How it is useful for desalination of brackish water? Explain with the diagram? (16marks)
10. Discuss in detail the problems caused due to the usage of hard water in boilers. How are they minimized by carbonate conditioning, and phosphate conditioning and Calgon conditioning? (8marks)
11. Distinguish between demineralized water and soft water. How is demineralized water prepared? (or) How is water softened by ion exchange method? Explain the detail with neat diagram?

12. Write a neat diagram, explain the principle, process, advantages and limitation of Reverse osmosis? (16marks)
13. Describe the ion exchange process in details. Give a neat sketch along with the chemical equation involved in each step. Also indicate how the ion exchangers are recovered? (16marks)
14. Write the difference between internal and external treatment of boilers. (8marks)
15. Discuss the various method available for internal conditioning? (10marks)

UNIT II SURFACE CHEMISTRY AND CATALYSIS

2-Marks

1. Define adsorption?
2. What are absorbent and absorbate?
3. What are sorption and desorption.
4. What is physical adsorption? Give examples.
5. What is chemisorption? Give examples.
6. Define catalyst?
7. What are the type of catalysis?
8. What is adsorption isotherm?
9. Distinguish between adsorption and absorption?
10. Define turn over number?

13-Marks

1. Distinguish between physical adsorption and chemisorption? (8marks)
2. Derive an expression for Langmuir unimolecular adsorption isotherm. What are it limitations?
3. Explain adsorption theory or contact theory with examples?
4. Define the term adsorption and list its application? (8marks)
5. (i) Give any three factors on which adsorption depends (ii) Derive Freundlich's adsorption isotherm
6. Enumerate the factor influencing the adsorption of gases on solids. Derive the Langmuir adsorption isotherm and interpret the results at 1. Low pressure and it 2. High pressure. (16mark)
7. Define adsorption isotherm. Explain the various types of adsorption isotherm? (16 mark)
8. Explain the role of absorbent in pollution abatement(or) Discuss the role of activated carbon in the abatement of air pollution and waste water treatment. (8marks)
9. Applying Michaelis and Menten equation is discuss the kinetics of enzyme catalysed reaction. (16marks)

10. Mention the important characteristic features of enzyme catalysis. (8marks)
11. Give the mechanism for enzyme Catalysed reaction is proposed by Michaelis and Menten. Write the rate equation for enzyme catalysed reaction and what do the various term in its stand for. What happens to the rate if 1. [S] < km 2. .[S] > km ? (16 marks)
12. Explain the following with suitable examples heterogeneous catalysis and Acid-base catalysis? (8marks)
13. Explain the types of absorption and given is neat sketches? (8marks)
14. Explain the factors affecting the extent of adsorption? (8marks)
15. Explain the details about contact theory with neat sketches? (8marks)

UNIT-III ALLOYS AND PHASE RULE

2-Marks What is

1.Define an alloy (or) what are alloys?

2. Mention the purpose of alloy making?

3. What are the objectives of heat treatment?

4.What are stainless steels?

5.What is meant by 18\8 stainless steels?

6. What are the types of phase diagram?

7.Define phase with suitable example?

8.What are the limitation of phase rule?

1. 9. What is tempering?
2. 10.What is meant by Degree of freedom?

13-Marks

1. Define alloy and discuss the function and effect of alloying of metals with examples? (16 marks)
2. What are the purposes of alloy making? Illustrate with suitable examples? (8marks)
3. How are the properties of metals improve by alloy formation? (8marks)
4. Discuss the heat treatment of steel in details? (or) Write note on heat treatment of steel? (8 marks)
5. Explain about ferrous alloys(or)Discuss the composition, characteristics and uses of ferrous alloy such as nichrome? (8marks)
6. What is stainless steel and explain its types? (8marks)
7. State phase rule and explain the terms involved in it? (8marks)

8. Explain the one-component water systems in details with neat diagram? (16 marks)
9. Discuss in detail the lead-silver system. Briefly write about Pattinson's process? (16marks)
10. Draw and explain with neat diagram in Pattinson's process? (16 markes)
11. What is condensed phase rule? What is the number of degrees of freedom at eutectic point for two-component systems? (16marks)
12. What is thermal analysis Draw the cooling curves of pure substance and mixture and discuss? (16 marks)
13. Draw and explain the phase diagram of water system? (16 marks)
14. Explain the importance or need of making alloys? (8marks)
15. Explain and details about it importance ferrous alloys? Give the examples? (8marks)

UNIT-IV FUELS AND COMBUSTION

2-marks

1. What is coal? How it is classified?
2. Define caking coals and coking coals?
3. What is meant by carbonation of coals?
4. Define octane number? How it can be improved?
5. Define cetane number? How it can be improved?
6. Mention the properties of CNG?
7. What is meant by Bio-diesel?
8. What is power alcohol?
9. What are the advantages of bio-diesel?
10. Define explosive range? Give examples?

13-Marks

1. Describe the proximate and ultimate analysis of coal? Mention its significance. (8marks)
2. How is metallurgical coke manufactured? What are their special properties and uses?
3. What is meant by crude petroleum? Discuss steps involved in refining of crude petroleum? (16marks)
4. What are knocking of petrol? What are the factors governing it? How is measured? (8marks)
5. What is synthetic petrol? How is manufactured by Bergius process? (16marks)
6. What is power alcohol? Explain the manufactured of power alcohol? (8marks)
7. Explain the explosive range of a fuel? (8marks)

8. Write the short notes on production composition and applications of LPG? (8marks)
9. What are fuel gases? How does Orsat's apparatus analysis them? (16marks)
10. What is meant by diesel-knocking? How is it found? How can be avoided? (8marks)
11. What are the advantages of compressed natural gas? (8marks)
12. Explain the calculation of minimum quantity of air required for the complete combustion of a fuel? (8marks)
13. What are leaded and unleaded petrol? Write the advantages and disadvantages? (8marks)
14. Explain the characteristics of good fuel? And their classification? (8marks)
15. Explain the details about biogas and brief notes on biogas generations?

UNIT- V ENERGY SOURCES AND STORAGE DEVICES

2-Marks

1. What is Moderator and give its examples?
2. Define nuclear fusion?
3. Define nuclear fission?
4. Mention few important characteristics of nuclear fission?
5. What is wind energy? How it is obtained?
6. What are the drawbacks of wind energy?
7. What are the advantages of super capacitors?
8. Define light water nuclear power plant?
9. What are secondary cell? Give an example?
10. What are the advantages of alkaline battery over dry battery?

13-Marks

1. Distinguish between nuclear fission and fusion reactions? (8marks)
2. Write a short note on nuclear fission and nuclear fusions? (8marks)
3. Describe briefly controlled nuclear fission as source of useful energy? (8marks)
4. What is nuclear reactor? Describe the components of a light water nuclear power plant with suitable block diagram? (16marks)
5. What is primary battery? Write a short note on dry cell? (8marks)
6. Write a brief note on lithium battery? (16marks)
7. What is breeder reactor? Explain with an example? (16marks)
8. What is lead accumulators? Explain the construction and functioning of a lead accumulator? (16marks)

9. What are solar cells? Explain with an example? (8marks)

10. Describe the construction and working of H2-O2 fuel cells? (16marks)
11. What is photovoltaic cell? Explain the working and construction of a photovoltaic cell with a diagram? (16marks)
12. How is wind energy harnessed? What are its advantages and limitations? (8marks)
13. How are super capacitors constructed? Explain the working and application of super capacitors? (8 marks)
14. What are fuel cells? Explain the construction and working of fuel cells? (16 marks)
15. Write a neat sketch explain the functioning of nuclear fission and fusion? (8marks).