KCG
COLLEGE OF TECHNOLOGY
Affiliated to Anna University
AUTONOMOUS

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023

First Semester

23CY111- ENGINEERING CHEMISTRY

(Common to: ALL ENGINEERING BRANCHES)

(Regulation 2021)

QUESTION BANK

(Applicable for Theory Courses)

UNIT 1				
Q.No	**Part A- Questions**	**Marks**	**CO's**	**Bloom's Level**
1.	**Define hardness of water.**	2	1	K1
2.	**Distinguish between hard water and soft water.**	2	1	K1
3.	**What are the salts responsible for carbonate and non-carbonate hardness?**	2	1	K1
4.	**List out the requirements of boiler feed water.**	2	1	K1
5.	**What are scales and sludges?**	2	1	K1
6.	**Why is hardness expressed in terms of calcium carbonate equivalent?**	2	1	K1
7.	**What are Zeolites?**	2	1	K1
8.	**What is Brackish water?**	2	1	K1
9.	**Why Calgon conditioning is better than phosphate conditioning?**	2	1	K1
10.	**Soft water is not demineralised water whereas demineralised water is soft water. Justify.**	2	1	K3
11.	**Phosphate conditioning is suitable at all-operating pressures? Give reasons to support this statement.**	2	1	K3
12.	**What is meant by caustic embrittlement? How is it prevented?**	2	1	K1
13.	**Name some chemicals that contribute for sludge in boilers.**	2	1	K1
14.	**How is exhausted resin regenerated in ion-exchange process.**	2	1	K1
15.	**How boiler corrosion is prevented?**	2	1	K1
Q.No	**Part B- Questions**	**Marks**	**CO's**	**Bloom's Level**

1.	**What are water quality Parameters? Explain its significance.**	13	1	K2
2.	**What is desalination? With a neat diagram, describe the 'reverse osmosis' method for the desalination of brackish water.**	13	1	K2
3.	**Describe the principle and procedure involved in the zeolite process for water treatment.**	13	1	K2
4.	**Explain the demineralisation of water by ion-exchange process**	13	1	K2
5.	**Explain the various steps involved in the municipal sewage water treatment process.**	13	1	K2
6	**Discuss the Break point Chlorination.**	13	1	K2
7	**Choose any four appropriate methods to remove scales from water through internal treatments.**	13	1	K3
8	**Write the steps and methodologies involved in the municipal water treatment with a neat diagram.**	13	1	K3
9	**Discuss the demonstration of estimation of hardness of EDTA.**	13	1	K2
10	**Discuss the internal conditioning agents.**	13	1	K2
	UNIT 2			
Q.No	**Part A- Questions**	**Marks**	**CO's**	**Bloom's Level**
1.	**Define Nanomaterials**	2	2	K1
2.	**Define Nanoscience.**	2	2	K1
3.	**Define Nanotechnology.**	2	2	K1
4.	**Define Nanocluster**	2	2	K1
5.	**Define Nanowire**	2	2	K1
6.	**List any four Nanomaterials?**	2	2	K1
7.	**Mention any two properties of Nanomaterials.**	2	2	K1
8.	**Define Nanorod.**	2	2	K1
9.	**What is CVD?.**	2	2	K1
10.	**What are carbon nanotubes?**	2	2	K1
11.	**Distinguish between bulk particles and Nanoparticles.**	2	2	K1

12.	**Mention some uses of carbon nanotubes.**	2	2	K1
13.	**What is magic number?**	2	2	K1
14.	**Mention some applications of Nanowires.**	2	2	K1
15.	**What is the basic principle involved in the Sol-gel synthesis of Nanomaterials?**	2	2	K1
Q.No	**Part B- Questions**	**Marks**	**CO's**	**Bloom's Level**
1.	**With a neat sketch explain sol-gel synthesis of Nanomaterials.**	13	2	K2
2.	**Discuss the size dependent properties of Nanomaterials.**	13	2	K2
3.	**Discuss the applications of Nanomaterials in energy, medicine, sensor and catalysis.**	13	2	K2
4.	**Explain laser ablation process for Producing nanomaterials with a neat diagram.**	13	2	K2
5.	**Explain the synthesis, properties and uses of Carbon Nanotubes.**	13	2	K2
6.	**Write a short note on Electrodeposition.**	13	2	K2
7	**Explain Electrospinning method of synthesis of Nanowires.**	13	2	K2
8	**Discuss the Solvothermal synthesis of ZnO Nanoparticle with a neat diagram.**	13	2	K2
9	**Discuss the synthesis, Properties and application of Nanoclusters.**	13	2	K2
10	**Discuss any one bottom up method of synthesis of Nanomaterials**	13	2	K2
	UNIT 3			
Q.No	**Part A- Questions**	**Marks**	**CO's**	**Bloom's Level**
1.	**Define Phase.**	2	3	K1
2.	**Define Composite**	2	3	K1
3.	**Define Degree of Freedom.**	2	3	K1
4.	**Write any two merits of the Phase rule.**	2	3	K1
5.	**Define Triple Point.**	2	3	K1
6.	**Write the uses of Phase diagram.**	2	3	K1

7.	**State the condensed phase rule**	2	3	K1
8.	**$NH_4Cl(s)$ ---------NH_3 (g) + HCl (g). Write the values of P, F and C for this system?**	2	3	K1
9.	**How many phases and components are present in the following system? (i) $CaCO_3$ (s)---------- CaO(s) + CO_2 (g) & (ii) $PCl_5(s)$---------- $PCl_3(s)$ + $Cl_2(g)$ at 500 C**	2	3	K1
10.	**Write the need for composites**	2	3	K1
11.	**Write the examples of natural and synthetic composite.**	2	3	K1
12.	**What is cured resin?**	2	3	K1
13.	**Write the classification of composite.**	2	3	K1
14.	**What are the advantages and disadvantages of using cotton fiber as reinforcement?**	2	3	K1
15.	**Write the advantages and disadvantages of MMC**	2	3	K1
Q.No	**Part B- Questions**	**Marks**	**CO's**	**Bloom's Level**
1.	**Draw a neat one component water system and explain it.**	13	3	K2
2.	**Draw a neat two component system with applications in detail.**	13	3	K2
3.	**State Phase rule and explain the terms involved in it.**	13	3	K2
4.	**Write short notes on Ceramic matrix composite ,Metal matrix and hybrid composite**	13	3	K2
5.	**Write a note on FRP composite**	13	3	K2
6	**Discuss the various reinforcement Materials its properties and advantages of its usage.**	13	3	K2
7	**Discuss the metal matrix composite in detail.**	13	3	K2
8	**With a neat sketch of CO_2 system explain its curves and areas in detail.**	13	3	K2
9	**Discuss the hybrid composite in detail.**	13	3	K2
10	**Write short note on cooling curves of solids.**	13	3	K2

UNIT 4				
Q.No	**Part A- Questions**	**Marks**	**CO's**	**Bloom's Level**
1.	**Define Gross or high calorific value (GCV)**	2	4	K1
2.	**Write the Dulong formula for GCV and NCV.**	2	4	K1
3.	**Distinguish between proximate and ultimate analysis of coal.**	2	4	K1
4.	**What is metallurgical coke? Give the characteristics of metallurgical coke.**	2	4	K1
5.	**What is meant by Knocking?**	2	4	K1
6.	**Define octane number. How can it be improved?**	2	4	K1
7.	**Define cetane number. How can it be improved?**	2	4	K1
8.	**Define explosive range. Give examples.**	2	4	K1
9.	**What is the difference between caking coal and coaking coal?**	2	4	K1
10.	**What are the requisites (or) characteristics of good metallurgical coke**	2	4	K1
11.	**Define ignition temperature.**	2	4	K1
12.	**Define explosive range. Give examples.**	2	4	K1
13.	**What are the classification of Petroleum?**	2	4	K1
14.	**What are the advantages and disadvantages of Biodiesel?**	2	4	K1
15.	**What is meant by flue gas?**	2	4	K1
Q.No	**Part B- Questions**	**Marks**	**CO's**	**Bloom's Level**
1.	**Discuss the proximate analysis analysis of Coal.**	13	4	K2
2.	**Explain flue gas analysis by ORSAT method**	13	4	K2
3.	**Illustrate the synthesis of Liquid fuel from solids.**	13	4	K3
4.	**Illustrate a method to manufacture metallurgical coke with valuable byproducts.**	13	4	K3
5.	**Explain Otto hoffmann method with a neat diagram**	13	4	K2
6.	**Define Green Hydrogen. Discuss the significance and challenges related to green Hydrogen(8).**	13	4	K2
7	**Discuss the ultimate analysis of Coal.**	13	4	K2

8	**Illustrate some of the sources of carbon foot print and compute the ways to lower the foot print.**	13	4	K3
9	**Discuss the biodiesel synthesis, properties and advantages**	13	4	K2
10	**Illustrate a methodology to calculate the amount of Sulphur and Nitrogen present in the coal.**	13	4	K3

UNIT 5

Q.No	Part A- Questions	Marks	CO's	Bloom's Level
1.	**Lithium battery is the cell of future.why?**	2	5	K1
2.	**What are fuel cells?**	2	5	K1
3.	**What is Photogalvanic cell?**	2	5	K1
4.	**What are the applications of H2-O2 fuel cell?**	2	5	K1
5.	**Will the EMF of battery vary with size? Give reasons for your answer**	2	5	K1
6.	**What is Breeder reactor?**	2	5	K1
7.	**State the reaction when a lead acid battery is recharged.**	2	5	K1
8.	**What is meant by Supercapacitor?**	2	5	K1
9.	**What are the electrodes used in the fuel cell?**	2	5	K1
10.	**Write the components of Lithium Ion battery.**	2	5	K1
11.	**Mention some important applications of Supercapacitor.**	2	5	K1
12.	**What are the advantages of Lithium cell?**	2	5	K1
13.	**What are the limitations of H2-O2 fuel cell?**	2	5	K1
14.	**Define Nuclear fission.**	2	5	K1
15.	**What is meant by nuclear reactor?**	2	5	K1
Q.No	**Part B- Questions**	**Marks**	**CO's**	**Bloom's Level**
1.	**Explain the construction and working of a Lead acid battery.**	13	5	K2
2.	**Conduct an experiment using bacteria to transform organic waste into electrical energy and discuss the benefits.**	13	5	K3
3.	**Showcase the benefits and uses of solar-derived renewable energy.**	13	5	K3

4.	**Construct a rechargeable battery using Pb and PbO2 and explain its charging and discharging reactions.**	13	5	K3
5.	**Sketch the reactor and explain the generation of electrical energy from it.**	13	5	K3
6	**With a neat diagram explain the working principle of H2-O2 fuel cell**	13	5	K2
7	**What are Lithium ion batteries? Explain the working and construction.**	13	5	K2
8	**Write notes on Supercapacitor.**	13	5	K2
9	**What is microbial fuel cell? Explain its principle and working with a neat diagram.**	13	5	K2
10	**Explain the power generation from light water nuclear reactor.**	13	5	K2

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