Presidency University, Bengaluru

School of Engineering

I Semester 2015-2016 | COMPREHENSIVE EXAMINATION | Course: **CHE A 101 Engineering Chemistry** (Closed Book)

Max Marks:60 | Max Time: 2 hours | Weightage: 30 % | 8th Jan' 2016 | **SET A**

Instructions to Candidates (A)

1. Write legibly.
2. Attempt all questions.
3. Use of scientific calculators is permitted
4. Assume any missing data suitably and clearly state and justify the same

---

PART A (10 X 3 = 30 Marks)

1. Explain the different types of voids

2. Write the difference between end point and equivalence point

3. Mention the characteristics of a good refractory

4. What is an alloy and mention its purpose.

5. Mention any three indicators used in different types of titrations

6. Mention any 4 types of coal. Give their primary uses

7. What are explosives? Give examples

8. Mention the factors enhancing the rate of corrosion

9. Give the specifications of potable water

10. What is calorific value? Mention the different types

PART B (4 X 5 = 20 Marks)

11. Give the construction and cell reactions of Lead-acid battery

12. Give the Synthesis, properties and uses of Nylon-6,6,

13. State and derive Bragg's law

14. Explain the fractional distillation of petroleum

PART C (1 X 10 = 10 Marks)

15. **A.** Calculate the total hardness of a water sample containing: $Ca(HCO_3)_2$=16.2 ppm, $Mg(HCO_3)_2$=14.6 ppm, $CaSO_4$=27.2 ppm, $MgSO_4$=24.0 ppm, $MgCl_2$=9.5 ppm. (Atomic weights: Ca: 40, Mg: 24, S:32, Cl:35.5, O:16, C: 12, H:1) **(6)**

B. Describe the process of desalination of water by electrodialysis with a neat diagram **(4)**

Presidency University, Bengaluru

School of Engineering

I Semester 2015-2016 | COMPREHENSIVE EXAMINATION | Course: **CHE A 101 Engineering Chemistry**

(Open Book)

Max Marks: 20 | Max Time: 1 hour | Weightage:10 % | 8th Jan' 2016 | **SET A**

(A)

Instructions to Candidates

1. Write legibly.
2. Attempt all questions.
3. Use of scientific calculator and text book are permitted
4. Assume any missing data suitably and clearly state and justify the same

---

2 X 10 = 20 Marks

1. (a). What is the principle involved in Bomb calorimeter? **(3)**

(b). What are the corrections required in bomb calorimeter? And why they are required? **(3)**

(c). A sample of coal contains 60% carbon, 30% hydrogen and 10% sulphur. The following data was obtained when coal was tested for calorific value in bomb calorimeter: Weight of coal burnt = 1g, Weight of water taken = 2500 g, Rise in temperature = 25 degree Celsius, Mass specific heat of apparatus = 0.098, Acid correction = 50 cal, Fuse-wire correction = 10 cal, Calculate the gross and net calorific value of coal sample (take latent heat of condensation of steam = 587 cal/g) **(4)**

2. A salt crystallizes into a face-centred cubic lattice which has edge length of 564 pm. If the density is 2.163 x 103 kg /m^3 and atomic mass 58.5 g/mol. Compute the Avogadro's number from the data. **(10)**

Presidency University, Bengaluru

School of Engineering

I Semester 2015-2016 | COMPREHENSIVE EXAMINATION | Course: **CHE A 101 Engineering Chemistry** (Closed Book)

Max Marks:60 | Max Time: 2 hours | Weightage: 30 % | 8th Jan' 2016 | **SET B**

B

Instructions to Candidates

1. Write legibly.
2. Attempt all questions.
3. Use of scientific calculators is permitted
4. Assume any missing data suitably and clearly state and justify the same

---

PART A (10 X 3 = 30 Marks)

1. Define: (i) Functionality of a monomer (ii) Degree of polymerization

2. Define the following : Standard Solution, Equivalence weight of a substance

3. Write the chemical formula and uses of Plaster of paris

4. What are refractories? Mention the different types of refractories

5. Classify insulators and give examples of liquid insulating materials.

6. Mention the criteria for the selection of lubricants.

7. What is an alloy and mention its purpose.

8. Mention any three indicators used in different types of titrations

9. Define Cracking of petroleum and mention the types of cracking

10. Give the composition of Natural gas, LPG

PART B (4 X 5 = 20 Marks)

11. Give the construction and cell reactions of Ni-Cd battery

12. Explain the Synthesis, properties and uses of Nylon-6,10

13. Describe with reactions, the manufacture of Portland cement.

14. Explain any two methods of protective coating to prevent corrosion

PART C (1 X10 = 10 Marks)

15. **A.** Calculate the Total hardness of a water sample containing: $Ca(HCO_3)_2$=15 ppm, $Mg(HCO_3)_2$=25 ppm, $CaSO_4$=30 ppm, $MgSO_4$=5 ppm, $MgCl_2$=15 ppm. (Atomic weights: Ca: 40, Mg: 24, S:32, Cl:35.5, O:16, C: 12, H:1) **(6)**

B. Describe the process of desalination of water by reverse osmosis with a neat diagram **(4)**

Presidency University, Bengaluru

School of Engineering

I Semester
2015-2016
Max Marks: 20

COMPREHENSIVE EXAMINATION

Max Time: 1 hour

Course: **CHE A 101 Engineering Chemistry**
(Open Book)
Weightage:10 %

8th Jan' 2016

SET B

(B)

Instructions to Candidates
1. Write legibly.
2. Attempt all questions.
3. Use of scientific calculator and text book are permitted
4. Assume any missing data suitably and clearly state and justify the same

---

2 X 10 = 20 Marks

1. For a project it is required to determine the calorific value of CNG. Select a suitable method and explain the process of determination of calorific value. Also explain the principle, construction and working of the apparatus used.

2. A waste water sample of 40 ml was diluted to 500 ml and equal volumes filled in two BOD bottles. About 50 ml of the water sample was titrated immediately and required 2.5 ml. of sodiumthiosulphate solution. The second sample was incubated for 4 days and it required 1.5 ml of 0.02 N sodiumthiosulphate solution for titration. Calculate biological oxygen demand of water.

ID No.:										

Section No.:		Signature of Invigilator:	

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016 Quiz Course: **CHE A 101 Engineering Chemistry**
(Closed Book)

Max Marks: 20 Max Time: 30 Min Weightage: 10% 16th Dec' 2015 **Set A**

Instructions to Candidates
1. Write legibly using pen only.
2. Do not overwrite.
3. Answer in the question paper itself, there will be no separate answer book provided.
4. Enter your ID No. and Section No. in the designated place

---

20 x 1 = 20 Marks

Fill in the blanks

1. _____ is a substance which produces heat or power by combustion.

2. Natural gas is made up of _____, _____, _____, _____ and _____.

3. A Carbonium ion is synthesized and used in the _____ mechanism of polymerization

4. Three main constituents of Portland cement are _____, _____ and _____

5. _____ analysis is used to determine the volume of solution of unknown concentration

6. _____ and _____ are two methods of argentometric titrations

7. The lattice defect where the cation moves from the correct lattice site to an interstitial position is called _____

8. The process in which spontaneous redox reaction occurs is called _____

9. _____ is a type of rock that contains sufficient minerals with important elements including metals that can be economically extracted from the rock.

10. _____ and _____ are non-ferrous alloys

Choose the best option (put a tick mark)

11. The carbons in graphite are _____ hybridized

a. sp^3 **b.** sp^2 **c.** sp^3d **d.** sp^3d^2

12. The number of atoms per unit cell of a face centred cubic lattice is _____

a. 1 **b.** 4 **c.** 8 **d.** 6

13. Natural Rubber is a polymer of _____

a. styrene **b.** Glycerine **c.** isoprene **d.** phenol-foemaldehyde

14. _____ is the process of reducing friction and wear between two moving surfaces by applying lubricating substances between the parts.

a. clinkering **b.** Cementing **c.** insulating **d.** Lubrication

15. Transesterification of vegetable oils that contain triglycerides produces _____

a. Biogas **b.** Biomass **c.** Biodiesel **d.** Coal gas

State whether the given statement is True or False (write T or F)

16. The raw materials used in the preparation of Nylon 6, 10 are hexamethylene diammine and adipic acid

17. Calcium oxide (CaO) is commonly known as lime stone

18. Coal gas is made up of CO, H_2 and CH_4

19. Replacing NH_4Cl with NaCl prevents corrosion of zinc cathode in dry cell

20. The titrations involving acid and alkali or in other words titrations involving reaction between H+ and OH− ions to form water are termed as Redox titrations

For official use (students shall not write beyond this line)

Marks scored out of 20 [ ]

Name and Signature of Examiner with Date

ID No.:										

Section No.:		Signature of Invigilator:	

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016 Quiz Course: **CHE A 101 Engineering Chemistry**
(Closed Book)

Max Marks: 20 Max Time: 30 Min Weightage: 10% 16th Dec' 2015 **Set B**

Instructions to Candidates
1. Write legibly using pen only.
2. Do not overwrite.
3. Answer in the question paper itself, there will be no separate answer book provided.
4. Enter your ID No. and Section No. in the designated place

---

20 x 1 = 20 Marks

Fill in the blanks

1. A good fuel should have a high _____ value.

2. The principal additives used in the compounding of plastics are _____, _____. _____ and _____.

3. Based on properties polymers can be classified in to _____ and _____

4. The Burning stage in the manufacture of cement takes place in three zones, namely, _____, _____, and _____.

5. _____ is based on the measurement of weight

6. Liquid crystals are closer to _____state rather than _____ state of matter

7. The phenomenon of solids having different physical properties in different directions is called _____.

8. The process of conversion of an inactive material back into active materials in a cell is called _____

9. Extraction of iron involves concentration , _____ and _____

10. Water gas is made up of _____ and_____.

Choose the best option (put a tick mark)

11. The co-ordination number of atoms in hexagonal close packing is _____

a. 8 **b.** 10 **c.** 12 **d.** 25

12. The total number of bonding sites or functional groups present in a monomer molecule is called the _____ of the monomer

a. Tacticity **b.** Chain movement **c.** Functionality **d.** polymer

13. Polymeric material used to bind together two or more similar/dissimilar surfaces is called as an _____.

a. Conducting polymers **b.** adhesive **c.** composite **d.** acrylics

14. Two examples of liquid insulating materials are _____ and _____

a. Mineral oil and vegetable oil **b.** Teflon and bakelite
c. Diamond and graphite **d.** Iron and Zinc

15. _____ is also known as Leclanche cell

a. Mercury Cell **b.** Dry cell **c.** Lead-acid battery **d.** Alkalline battery

State whether the given statement is True or False (write T or F)

16. The orientation of monomeric units in a polymer either orderly or disorderly is called Tacticity

17. The chemical formulae of Gypsum and Plaster of Paris are $CaSO_4.2H_2O$ and $CaSO_4.\ ½\ H_2O$ respectively

18. The 14 basic arrangements of lattices in which the similar points can be arranged in a regular pattern in a three-dimensional space are called Bravias Lattices

19. Mercury Cell is also known as Ruben–Mallory cell

20. Titrations involving the direct titration of iodine with a reducing agent are termed as Iodometry

For official use (students shall not write beyond this line)

Marks scored out of 20 [ ]

Name and Signature of Examiner with Date

ID No.:										

Section No.:		Signature of Invigilator:	

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016 Quiz Course: **CHE A 101 Engineering Chemistry**
(Closed Book)

Max Marks: 20 Max Time: 30 Min Weightage: 10% 16th ~~Dec'20~~15 29/12/15 **Set C**

Instructions to Candidates
1. Write legibly using pen only.
2. Do not overwrite.
3. Answer in the question paper itself, there will be no separate answer book provided.
4. Enter your ID No. and Section No. in the designated place

---

20 x 1 = 20 Marks

Fill in the blanks

1. The product of burning coal in the absence of air is _____.

2. The raw materials used in the preparation of Bakelite are _____ and _____.

3. Lime is manufactured by heating _____.

4. Refractories are classified into _____, _____ and _____

5. _____ and _____ are two methods of gravimetric analysis

6. The direction of preferred orientation in a liquid crystal is called _____

7. The galvanic cells used to form batteries can be classified as _____ and _____

8. _____ emits water vapour and no other harmful chemicals to the environment.

9. _____ and _____ are alloys of steel.

10. Decomposition of high molecular weight compounds (with high boiling points) to low molecular weight compounds (with low boiling points) is called_____.

Choose the best option (put a tick mark)

11.The hexagonal network sheets of graphite are stacked and loosely bonded by _____.

a. Covalent bond **b.** Ionic bond **c.** Metallic bond **d.** Van der waal's force

12. The kind of polymerization in which the polymer formed by the reaction of simple polar-group containing molecules with the elimination of small molecules like H2O, NH3 etc. is called _____ polymerization.

a. Condensation **b.** Co-polymerization **c.** Addition **d.** Free-radical

13. _____ materials are inorganic materials that can be used as binders for aggregates.

a. plastics **b.** Cementing **c.** Refractories **d.** Lubricating

14. In the manufacture of cement, the maximum temperature at which the constituents are burnt is _____.

a. 1800°C **b.** 600° C **c.** 1200° C **d.** 1000° C

15. The weight of an element or compound that will combine with or displace 8 grams of oxygen or 1.007 97 grams of hydrogen or 35.45 g of chlorine is called _____ of an element

a. Molality **b.** Standard Solution **c.** Formality **d.** Equivalent weight

State whether the given statement is True or False (write T or F)

16. A carbonium ion is synthesized and used in the anionic mechanism of polymerization

17. The main component that forms LPG is Butylene.

18. Grain boundaries and stacking faults are examples of point defects.

19. Metals are substances with high density, boiling and melting points, electrical and thermal conductivity, and strength and workability (malleability and ductility).

20. 1 gram molecular weight of a solute dissolved in 1 L of a solvent gives 1 Molar solution

For official use (students shall not write beyond this line)

Marks scored out of 20 [ ]

Name and Signature of Examiner with Date

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016 Test 1 Course: **CHE A 101 Engineering Chemistry**
(Closed Book)

Max Marks: 30 Max Time: 50 Min Weightage: 15 % 05 October 2015 **Set A**

Instructions to Candidates
1. Write legibly, briefly and summarize. Highlight main points
2.Attempt all questions serially, in order of question paper
3. Assume suitable data wherever necessary and justify the same.

Ques 1: Answer the following in short **(3Q x 2M = 6M)**

1. Write the monomer unit for the following polymers.
   Polystyrene, Polyacrylonitrile
2. What is Vulcanization of rubber? Give any two important properties of vulcanized rubber.
3. What is Tacticity of a polymer? Classify polymers based on Tacticity

Ques 2: Answer the following **(3Q x 3M = 9M)**

1. What are composites? What are the two levels of their classification
2. What is Ziegler-Natta Catalyst? Where is it used?
3. Describe the preparation and uses of polycarbonates

Ques 3: Answer the following **(3Q x 5M = 15M)**

1. Explain the synthesis and uses of Bakelite
2. Discuss the steps involved in Cationic mechanism of polymerization
3. Give any five differences between Thermopolymers and Thermosetting Polymers

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016 Test 1 Course: **CHE A 101 Engineering Chemistry**
(Closed Book)

Max Marks: 30 Max Time: 50 Min Weightage: 15 % 05 October 2015 **Set B**

Instructions to Candidates
1. Write legibly, briefly and summarize. Highlight main points
2.Attempt all questions serially, in order of question paper
3. Assume suitable data wherever necessary and justify the same.

Ques 1: Answer the following in short **(3Q x 2M = 6M)**

1. Classify the following between thermosetting and thermoplastic polymers
   Bakelite, Nylon
2. How BUNA-S rubber different from BUNA-N rubber?
3. What are conducting polymers? Give two examples

Ques 2: Answer the following **(3Q x 3M = 9M)**

1. Mention the any three types of Semiconducting Polymers
2. Mention any two properties and applications of acrylic fibres
3. Draw a flow chart to describe the processing of latex.

Ques 3: Answer the following **(3Q x 5M = 15M)**

1. Discuss the synthesis and applications of Araldite
2. Explain Anionic mechanism of polymerization
3. What are the ingredients used in compounding of plastics? What are their functions

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016 Test 2 Course: **CHE A 101 Engineering Chemistry**
(Closed Book)

Max Marks: 30 Max Time: 50 Min Weightage: 15 % 23rd Nov' 2015 **Set A**

Instructions to Candidates
1. Write legibly and draw neat sketches wherever necessary.
2. Attempt all questions.
3. Assume suitable data wherever necessary and justify the same.

Part A (4 x 3 = 12 Marks)

1. Differentiate between Amorphous and crystalline solids
2. What are P- type and N-type semiconductors?
3. Define the following: Crystal lattice and lattice point
4. What is an indicator? Name the indicators used in aacid-base titrations

Part B (3 x 4 = 12 Marks)

5. Mention the components of a battery and their respective functions.
6. Define unit cell. Calculate the number of atoms per unit cell in the following:
(a) Simple Cubic
(b) Body-centred cubic
(c) Face-centred cubic
7. State and derive Bragg's equation

Part C (1 x 6 = 6 Marks)

8. Explain the construction and working of a dry cell using the example of Leclanche cell with a labelled diagram. How does alkaline battery different from Leclanche cell?

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016 Test 2 Course: **CHE A 101 Engineering Chemistry**
(Closed Book)

Max Marks: 30 Max Time: 50 Min Weightage: 15 % 23rd Nov' 2015 **Set B**

Instructions to Candidates
1. Write legibly and draw neat sketches wherever necessary.
2. Attempt all questions.
3. Assume suitable data wherever necessary and justify the same.

Part A (4 x 3 = 12 Marks)

1. Define the following:

a) Normality

b) Law of chemical equivalence

2. Differentiate between lyotropic and thermotropic liquid crystals
3. Give the properties and uses of lime
4. Differentiate between charging and discharging process of a battery

Part B (3 X 4 = 12 Marks)

5. Write any two characteristics and applications of liquid crystals?

6. Mention the types of defects in a crystal. How is Frenkel defect different from Schotky defect ?

7. What are the different types of volumetric titration? Explain the principle involved in redox titration

Part C (1 x 6 = 6 Marks)

8. Explain the construction of a hydrogen-oxygen fuel cell. Give the cell reaction and the advantages of using this fuel cell

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016 Test 2 (M/A) Course: **CHE A 101 Engineering Chemistry** (Closed Book)

Max Marks: 30 Max Time: 50 Min Weightage: 15 % ~~23rd Nov' 2015~~ 22/12/15 **Set C**

Instructions to Candidates

1. Write legibly and draw neat sketches wherever necessary.
2. Attempt all questions.
3. Assume suitable data wherever necessary and justify the same.

Part A (4 x 3 = 12 Marks)

1. Mention the Bravais lattices for the following crystals
   a) Cubic
   b) Orthorhombic
   c) Tetragonal
2. How are batteries classified? Give examples.
3. Discuss any one method of gravimetric analysis
4. Write the sequence involved in the setting and hardening of cement

Part B (3 x 4 = 12 Marks)

5. Mention the composition and the functions of the raw materials used in the manufacture of Portland cement
6. Differentiate between iodometric and iodimetric titrations
7. Explain the structure of Nacl and how is it different from CsCl

Part C (1 x 6 = 6 Marks)

8. Describe the stages involved in the manufacture of Portland Cement