

Reg. No. :

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Question Paper Code : 41515

B.E./B.Tech. DEGREE EXAMINATIONS, JANUARY 2022.

First Semester

Civil Engineering

CY 3151 — ENGINEERING CHEMISTRY

(Common to All Branches (Except Marine Engineering))

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why do we express hardness of water in terms of calcium carbonate equivalent?
2. What is brackish water?
3. Define nanomaterials.
4. What are nanoclusters?
5. What is reduced phase rule?
6. Give two examples of hybrid composites.
7. What is meant by cetane number?
8. How do you control carbon foot print (any two)?
9. State critical mass.
10. Write any two uses of a lithium ion battery.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the water quality parameters? Explain their significance. (8)
- (ii) Write a note on break point chlorination. (8)

Or

- (b) (i) How is sea water purified using reverse osmosis technique? (8)
(ii) Explain sludge and scale formation in boilers. How are they removed? (8)

12. (a) (i) Explain laser ablation process for producing nanomaterials with a neat diagram. (8)
(ii) Discuss about size dependent properties of nanomaterials. (8)

Or

- (b) (i) With a neat sketch, explain Sol-Gel synthesis for producing nanomaterials. (8)
(ii) Write an informative note on the applications of nanomaterials. (8)
13. (a) (i) State phase rule. Explain the terms involved in it. (8)
(ii) With the help of a neat phase diagram, describe lead and silver system. (8)

Or

- (b) (i) What are composite materials? Discuss the important types of fiber reinforced composites. (8)
(ii) Discuss the properties and applications of metal matrix composites. (8)
14. (a) (i) Describe how proximate analysis of coal is carried out. Mention their significances. (8)
(ii) How is synthetic petrol manufactured by Bergius process? (8)

Or

- (b) (i) Calculate the gross and net calorific value of coal having the following compositions:
C = 85%, H = 8%, S = 1%, N = 2%, ash = 4%, latent heat of steam = 587 cal/g. (8)
(ii) How can power alcohol be helpful in fuel crisis? (8)
15. (a) (i) Explain the various components of light water nuclear power plant with a suitable block diagram. (8)
(ii) How is wind energy harnessed? What are its advantages and limitations. (8)

Or

- (b) (i) Explain the construction and working of lead acid battery. (8)
(ii) Describe the construction and working of H₂-O₂ fuel cell. (8)

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Question Paper Code : 60027

I YEAR

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022

First Semester

Civil Engineering

CY 3151 – ENGINEERING CHEMISTRY

(Common to: All Branches (Except Marine Engineering))

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give a brief note on BOD and COD.
2. Write the reasons for the caustic embrittlement in boilers.
3. Write about the important categories of nano-materials.
4. Give a brief description about the sol-gel principle.
5. State about the requisites of composite materials.
6. Write the concept of hybrid composites.
7. Give a brief note on power alcohol and bio diesel.
8. Write about the spontaneous ignition temperature.
9. List out the important applications of solar cells
10. Give a brief note on the microbial fuel cell.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the process of desalination of brackish water by the reverse osmosis method.

Or

- (b) Write the detailed description about the municipal water treatment process.

12. (a) Write in detail about the preparation of nano-materials by electro spinning technique.

Or

(b) Explain on the application of nano-materials in electronics and catalysis.

13. (a) Explain the properties and applications of metal matrix composites.

Or

(b) Explain the properties and applications of polymer matrix composites.

14. (a) Explain the manufacturing method of synthetic petrol by Bergius process.

Or

(b) Explain the flue gas analysis by the Orsat method.

15. (a) Give the detailed description about the recent development in the solar cell materials.

Or

(b) Explain the principle and the working process of lithium-ion battery.

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Question Paper Code : 30130

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

First Semester

CY 3151 — ENGINEERING CHEMISTRY

(Common to : All branches (Except Marine Engineering))

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State about the influences of TDS and BOD in drinking water.
2. Write the reasons for the formation of scale and sludge in boilers.
3. Give the important properties and uses of nano clusters.
4. Specify the important applications of nano materials in catalysis.
5. Mention the salient features of composites.
6. Give a clear note on the reduced phase rule.
7. Write the analysis of coal by proximate method.
8. Define carbon foot print.
9. State the working principle of solar cells.
10. Give a brief note on the microbial fuel cell.

PART B — (5 × 16 = 80 marks)

11. (a) Give a detailed account on the water purification process by demineralization based on ion exchange method with neat diagram. Write equations for the same.

Or

- (b) Discuss the process of desalination of the brackish water by reverse osmosis and distillation processes.

12. (a) Explain the preparation of nano materials by sol-gel and chemical vapour deposition methods with neat diagrams.

Or

- (b) Explain the preparation of nano materials by electrochemical deposition and electro spinning methods with neat diagrams.

13. (a) With a neat diagram, describe the two component system with respect to lead and silver.

Or

- (b) Summarize on the properties and applications of metal matrix composite and ceramic matrix composite.

14. (a) Elaborate the manufacture of metallurgical coke by Otto Hoffmann method.

Or

- (b) Elaborate the analysis of flue gas by Orsat method.

15. (a) Explain the working principle and applications of wind energy and geothermal energy.

Or

- (b) Explain the working principle of lead acid battery and lithium-ion battery.

Reg. No. :

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Question Paper Code : 30508

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

First Semester

CY 3151 – ENGINEERING CHEMISTRY

(Common to: All Branches (Except Marine Engineering))

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the harmful effects of silica present in boiler feed water.
2. What is caustic embrittlement? Mention any one method to prevent it.
3. What are nanoparticles?
4. Write the principle involved in the sol-gel process.
5. What are the uses of a phase diagram?
6. Name any two applications of fiber reinforced laminates.
7. Define octane number. How can it be improved?
8. What is trans - esterification?
9. What are the drawbacks of nuclear energy?
10. Will the emf of a battery vary with size? Give reason.

PART B — (5 × 16 = 80 marks)

11. (a) (i) List the important requirements for drinking water. Briefly describe the various steps involved in the treatment of water for domestic purpose. (8)
(ii) What is desalination? Explain reverse osmosis process and mention any two advantages of reverse osmosis. (8)

Or

- (b) (i) Explain the mechanism of ion exchange process of water treatment. Give any two advantages of it over zeolite process. (8)
- (ii) What are internal conditioning of water? How is internal treatment of boiler feed water carried out using phosphate and calgon conditioning? (8)
12. (a) (i) What are carbon nanotubes? Write the fabrication and structure of carbon nanotubes. (8)
- (ii) Write a note on the size dependence properties of nanomaterials. (8)
- Or
- (b) Explain the applications of nanomaterials in medicine, agriculture, energy and catalysis.
13. (a) (i) Draw and discuss the phase diagram of Pb-Ag system. Discuss Pattinson process based on phase rule. (8)
- (ii) Draw schematically the phase diagram of the water system and apply the Gibbs phase rule to interpret it. (8)
- Or
- (b) Explain the various constitution of composites with elaborate examples. (16)
14. (a) (i) Calculate the higher and lower calorific values of a coal sample having the following composition:
Carbon = 80%, Hydrogen = 7%, Oxygen = 3%, Sulphur = 3.5%, Nitrogen = 2.1% and ash = 4.4%. (8)
- (ii) Explain the process involved in the preparation of liquid fuels from solid coal. (8)
- Or
- (b) Explain the principle working and significance of flue gas analysis by Orstat's method.
15. (a) (i) Write a note on breeder reactor. (8)
- (ii) How is wind energy harnessed? Mention its advantages and limitations. (8)
- Or
- (b) (i) Explain the construction and working of lead acid battery. (8)
- (ii) Describe the construction and working H₂-O₂ fuel cells. (8)

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Question Paper Code : 20917

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

First Semester

Civil Engineering

CY 3151 – ENGINEERING CHEMISTRY

(Common to: All Branches (Except Marine Engineering))

(Also common to PTCY 3151 for BE (Part – Time) – (Except Electrical and Electronics Engineering) – Regulations 2023)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the causes for sludges and scales in the boilers?
2. Differentiate the zeolite process with demineralization technique.
3. Give the distinction between nano materials and bulk materials.
4. Give a brief description about the electrochemical deposition.
5. With an example, write about the one component system.
6. State the salient features of hybrid composites.
7. Write the importance of octane number in the relevant fuel.
8. Give a brief note on the spontaneous ignition temperature.
9. Highlight the important applications of solar cells.
10. Highlight the salient features of microbial fuel cell.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the municipal water treatment in accordance with the break point chlorination.

Or

- (b) Explain the treatments involved in boiler feed water by the important internal conditioning aspects.

12. (a) Discuss in a detailed manner about the properties and uses of nanoclusters and nanowires.

Or

- (b) Discuss in a detailed manner about the chemical vapour deposition and electro spinning.

13. (a) Elaborate in systematic manner about the construction of a simple eutectic phase diagram.

Or

- (b) Elaborate in a stepwise manner about the construction of metal matrix and polymer matrix.

14. (a) Summarize the manufacture of metallurgical coke by the Otto Hoffmann method.

Or

- (b) Summarize in a specific manner on the Orsat method for the flue gas analysis.

15. (a) Elaborate in a suitable way about the recent developments in solar cell materials.

Or

- (b) Explain in a specific manner on the light water nuclear power plant.

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Question Paper Code : 50950

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

First Semester

Civil Engineering

CY 3151 – ENGINEERING CHEMISTRY

(Common to : All Branches (Except B.E. Marine Engineering))

(Regulations 2021)

(Also Common to : PTCY3151 – Engineering Chemistry for B.E. (Part–Time) First Semester – Civil Engineering/Computer Science and Engineering/Electronics and Communication Engineering/Mechanical Engineering – Regulations 2023)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What do you understand by break point chlorination?
2. State the principle of RO process.
3. Bring out the difference between nanorod and nanowire.
4. What are carbon nano tubes? What are its types?
5. State the reduced phase rule.
6. Write a note on Octane number.
7. What is knocking?
8. List the advantages of biodiesel.
9. What are the advantages of supercapacitors? Where are they used?
10. Write the difference between primary and secondary battery.

PART B — (5 × 16 = 80 marks)

11. (a) Distinguish between
- (i) priming and foaming (4)
 - (ii) internal treatment and external treatment (4)
 - (iii) phosphate conditioning and calgon conditioning (4)
 - (iv) scale and sludge. (4)

Or

- (b) With a neat diagram, explain the working principle, mechanism, process steps, advantages and limitations of ion exchange demineralization process. (16)
12. (a) (i) Explain the CVD process in the preparation of nanotubes and its benefits. (8)
- (ii) Discuss the application of nanomaterials in medicine with appropriate examples. (8)

Or

- (b) (i) Explain the electro spinning process in the preparation of nano wires and its benefits. (8)
- (ii) Discuss the use of nanomaterials in electronic with suitable examples. (8)
13. (a) (i) Construct a simple eutectic phase diagram and explain with an example. (10)
- (ii) What are hybrid composites? What is their need? Give examples. (6)

Or

- (b) (i) Explain the lead silver phase diagram using phase rule. (10)
- (ii) Write a note on matrix and reinforcement. Give examples. (6)
14. (a) Explain the Bergius process for the manufacture of synthetic petrol. Discuss the importance of catalysts in the process. (16)

Or

- (b) Discuss the Otto Hoffmann process for the manufacture of metallurgical coke. Explain the product recovery carried out in the process (16)
15. (a) Explain the working mechanism of Li ion battery. Write the electrode reaction during charging and discharging. Discuss the use of batteries and their working principles in electric vehicles. (16)

Or

- (b) (i) With a neat diagram, discuss the mechanism of $H_2 - O_2$ fuel cell. (8)
- (ii) How is the working of a microbial fuel cell different from other fuel cells. (8)