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Question Paper Code : 27653

B.E./B.Tech. DEGREE EXAMINATION, DECEMBER 2015/JANUARY 2016

First Semester

Civil Engineering

CY 6151 – ENGINEERING CHEMISTRY – I

(Common to all branches except Marine Engineering)

(Regulations - 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Differentiate between thermosetting and thermoplastic polymers.
2. Brief about tacticity of polymers.
3. State Clausius and Kelvin Statements of second law of thermodynamics.
4. Calculate the entropy change when 10 g of ice is converted into liquid water at 0 °C.
Latent heat of fusion of ice is 80 cal/g.
5. Mention the essential condition for a molecule to be IR active.
6. State Lambert-Beer law.
7. What is meant by component ? Give suitable example.
8. State the reduced Phase rule.
9. Differentiate the terms nano rod from nano wire.
10. Why different colours of fluorescence light are observed in nano particles ?

PART – B (16 × 5 = 80 Marks)

11. (a) (i) Write the mechanism of free radical polymerization. (8)
(ii) What is glass transition temperature ? Explain factors influencing T_g. (8)

OR

- (b) (i) Discuss in detail about the emulsion and solution polymerisation techniques. (8)
(ii) Give the preparation, properties and uses of nylon 6,6. (8)

12. (a) (i) Derive the 4 forms of Maxwell's relations. (8)
(ii) Derive the Gibb's Helmholtz equation. Give its two important applications. (8)

OR

- (b) (i) Derive Clausius – Clapeyron equation. (8)
(ii) Derive Vant Hoff's Isochore equation. (8)

13. (a) (i) Write the principle, instrumentation and applications of IR spectroscopy. (8)
(ii) Explain in detail about types of electronics transition that occur in UV-Visible spectroscopy with suitable examples. (8)

OR

- (b) (i) Brief about the following : (8)
Inter System Crossing, Internal Conversion, Fluorescence and Phosphorescence.
(ii) What is photosensitization ? Discuss its mechanism in detail. (8)

14. (a) (i) Draw the phase diagram of water system and explain in detail. (8)
(ii) Draw the phase diagram of Zinc-Magnesium system and explain in detail. (8)

OR

- (b) (i) Draw the phase diagram of lead silver system and explain in detail. (8)
(ii) What are the effects of alloying elements ? Give its functions. (8)

15. (a) (i) Explain in detail about the preparation of CNT by Laser Ablation method. (8)
(ii) Explain about the synthesis of nanoparticles by hydrothermal method. (8)

OR

- (b) (i) Explain the properties and applications of nanoparticles. (8)
(ii) Explain about the synthesis of nanoparticles by electrodeposition method. (8)

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Question Paper Code : 37005

B.E./B.Tech. DEGREE EXAMINATION, JANUARY 2014.

First Semester

Civil Engineering

CY 6151 — ENGINEERING CHEMISTRY — I

(Common to All Branches)

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by degree of polymerisation?
2. Mention any two uses of epoxy resin.
3. Calculate the entropy change for the reversible isothermal expansion of 10 moles of an ideal gas to 50 times its original volume at 298k.
4. Define entropy for an ideal gas.
5. What is chemiluminescence?
6. What is meant by absorption of radiation?
7. What are alloys?
8. What is condensed Phase rule?
9. What are carbon nanotubes?
10. What is laser ablation?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss cationic polymerization mechanism in detail. (8)
- (ii) Distinguish thermoplastics and thermosetting plastics. (8)
- Or
- (b) (i) Explain any four properties of polymers in detail. (8)
- (ii) Discuss the preparation, properties and uses of Nylon 6:6. (8)
12. (a) (i) Derive Gibbs-Helmholtz equation and Explain. (8)
- (ii) Compute free energy change when 5 moles of an ideal gas expands reversibly and Isothermally at 300 K from an initial volume of 50 L to 1000 L. (8)
- Or
- (b) (i) What meant by Vant Hoff's reaction isotherm? Derive the expression for a reaction isotherm of the general reaction:
 $aA + bB \rightarrow cC + dD$. (8)
- (ii) Discuss the criteria for chemical reaction to be spontaneous. (8)
13. (a) (i) State and explain the laws of Photochemistry in detail. (8)
- (ii) Explain the principle and instrumentation of UV-Visible spectroscopy with neat block diagram. (8)
- Or
- (b) (i) Explain the principle and instrumentation of IR spectroscopy with a neat block diagram. (8)
- (ii) Discuss
- (1) Fluorescence and (4)
- (2) Phosphorescence in detail. (4)
14. (a) (i) Draw a neat one component water system and explain in detail. (8)
- (ii) Discuss the heat treatment of steel in detail. (8)
- Or
- (b) (i) Draw a neat zinc - magnesium system and explain in detail. (8)
- (ii) Discuss composition, properties and uses of any two non-ferrous alloys. (8)

37005

15. (a) (i) How are carbon nanotubes are synthesised? Explain in detail. (8)
(ii) Distinguish molecules, nanoparticles and bulk materials. (8)

Or

- (b) (i) Discuss various types of synthesis involved in the preparation nanomaterials. (8)
(ii) Explain
(1) nano cluster (4)
(2) nanowire with examples. (4)

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Question Paper Code : 57264

B.E. /B. Tech. DEGREE EXAMINATION, MAY/JUNE 2016

First Semester

Civil Engineering

CY 6151 – ENGINEERING CHEMISTRY – I

(Common to all branches except Marine Engineering)

(Regulation 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Differentiate between thermoplastics and thermosetting polymers.
2. Define degree of polymerization.
3. Write down the criteria of spontaneity.
4. What is Gibbs free energy ?
5. What is fluorescence ?
6. State Beer-Lambert law.
7. Define degree of freedom.
8. What are the basic differences between brass and bronze ?
9. What are nano rods ?
10. List out any four applications of nano materials.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Write the preparation and properties of (8)
- Nylon 6,6
 - Epoxy resins
- (ii) Distinguish between addition and condensation polymerization (8)

OR

- (b) (i) Discuss the mechanism of addition polymerization. (8)
- (ii) Explain the number average and weight average molecular weight. (8)

12. (a) (i) Prove the Maxwell relation (8)

$$\left(\frac{\partial V}{\partial T}\right)_P = -\left(\frac{\partial S}{\partial P}\right)_T$$

- (ii) Derive Gibbs Helmholtz equation (8)

OR

- (b) (i) Derive an expression for entropy change of an ideal gas at constant temperature (8)
- (ii) Derive Clausius-Clapeyron equation. (8)

13. (a) (i) Explain the Einstein-Stark law of photochemical equivalence. (8)
- (ii) Draw the block diagram of IR spectrometer and explain the function of various components. (8)

OR

- (b) (i) Explain the term photosensitization and quantum yield. (8)
- (ii) Explain in detail, vibrational and rotational transition. (8)

14. (a) (i) Draw the phase diagram for lead-silver system and explain the salient features. (8)
- (ii) Explain the function and effects of alloying elements. (8)

OR

- (b) (i) Write a note on heat treatment of steel. (8)
- (ii) Draw and explain the labelled phase diagram of water system. (8)
15. (a) (i) Explain how nano materials are synthesized by laser ablation method and thermolysis. (8)
- (ii) What is chemical vapour deposition ? Explain thermal CVD and photo laser CVD . (8)

OR

- (b) (i) Write short notes on : (8)
- Nano clusters
 - Nano wires
- (ii) Briefly explain any four important properties of nano materials. (8)
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Question Paper Code : 71695

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

First Semester

Civil Engineering

CY 6151 — ENGINEERING CHEMISTRY — I

(Common to all branches except Marine Engineering)

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is Degree of polymerisation?
2. What are homo and hetero chain polymers? Give an example for each.
3. What is Helmholtz work Function?
4. Define entropy.
5. Define Grotthus–Draper Law.
6. What is Photosensitization? Give Examples.
7. What is Degree of Freedom?
8. What are the applications of Phase Diagrams?
9. What are Carbon Nano Tubes?
10. How is CNT used in fuel cells?

PART B — (5 × 16 = 80 marks)

11. (a) Discuss in detail about Cationic and anionic polymerization. (16)

Or

- (b) Discuss in detail about bulk, solution, suspension and emulsion polymerization techniques. (16)
12. (a) Derive (i) Gibbs – Helmholtz and (ii) Maxwell equations. (8+8)

Or

- (b) The equilibrium constant K_p for a reaction is 3.0 at 673K and 4.0 at 773 K. Calculate the value of ΔH° for the reaction ($R = 8.3J$). (16)
13. (a) Discuss the following photo process in detail:
- (i) Internal Conversion (6)
 - (ii) Intersystems crossing. (5)
 - (iii) Phosphorescence. (5)

Or

- (b) Discuss the principle and instrumentation of UV-Visible spectroscopy. (16)
14. (a) Explain the phase rule for water system. (16)

Or

- (b) Define the terms with respect to alloys.
- (i) Annealing (6)
 - (ii) Hardening (5)
 - (iii) Normalizing. (5)
15. (a) Discuss in Detail about the synthesis of carbon nano tubes. (16)

Or

- (b) Explain the applications of Nanoparticles.
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Question Paper Code : 77103

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

First Semester

Civil Engineering

CY 6151 — ENGINEERING CHEMISTRY — I

(Common to all branches except Marine Engineering)

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the functionality of (a) propylene (b) Phenol towards polymerisation?
2. Define polydispersity index.
3. What happens to entropy of the following?
 - (a) A gaseous nitrogen is converted to liquid nitrogen.
 - (b) Solid iodine is sublimed to its vapour.
4. Calculate the entropy change involved in converting one mole of water at 373 K to its vapour at the same temperature. (Molar heat of vaporisation of water = 40.66 kJ k⁻¹ mole⁻¹).
5. State Stark–Einstein law of photochemistry.
6. Mention the possible electronic transitions that can occur in organic molecules.
7. What do you understand by reduced phase rule?
8. What is hardening of steel? Mention its purpose.
9. Mention the difference between a nanorod and a nanowire.
10. Write any two applications of carbon nanotubes.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the mechanism of polymerization through free radicals. (8)
 (ii) What are the different types of molecular mass of polymers? Explain each type with significance. (8)

Or

- (b) (i) What are the differences between thermoplastic polymers and thermosetting polymers? (8)
 (ii) Explain the following :
 (1) Emulsion polymerisation. (4)
 (2) Solution polymerisation. (4)
12. (a) (i) Derive Gibb's – Helmholtz equations. (8)
 (ii) Define free energy. Explain its significance. (4)
 (iii) At what temperature will water boil when the atmospheric pressure is 528 mm Hg? Latent heat of vaporisation of water is 545.5 cal/g. (4)

Or

- (b) (i) Derive Maxwells relations (any four). (8)
 (ii) Derive the relation, $\Delta G^\circ = -RT \ln K_{eq}$. Calculate the standard entropy change for the reaction, $A \rightleftharpoons B$, if the value of $\Delta H^\circ = 28.4 \text{ kJ/mol}$ and equilibrium constant is 1.8×10^{-7} at 298 K. (8)
13. (a) (i) Explain the instrumentation of a uv-visible spectrophotometer. (8)
 (ii) What is quantum efficiency? How is it determined? (8)

Or

- (b) (i) Explain the following :
 (1) Flourescence. (4)
 (2) Phosphorescence. (4)
 (ii) State Lambert - Beer Law. Derive its mathematical form. What are its limitations? (2 + 4 + 2)

14. (a) (i) Apply phase rule to water system and explain the characteristics. (8)
(ii) What are the purposes of alloy making? Illustrate with suitable examples. (4 + 4)

Or

- (b) (i) Discuss the phase diagram of silver-lead system and explain the eutectic mixture, characteristics and uses. (8)
(ii) Give the composition and applications (two each) of the following alloys : (4 × 2)
- (1) Brass
 - (2) Bronze
 - (3) Nichrome
 - (4) Stainless steel.
15. (a) (i) What are the properties that change from its bulk form to nano size form? Explain each with example. (8)
(ii) Explain chemical vapour deposition technique of synthesis of nano particles. (8)

Or

- (b) (i) Discuss the solvothermal and laser ablation methods of synthesis of nano materials. (8)
(ii) Compare the properties of molecules, nanoparticles and bulk materials. (8)
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Question Paper Code : 80308

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

First Semester

Civil Engineering

CY 6151 — ENGINEERING CHEMISTRY — I

(Common to all branches except Marine Engineering)

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are Copolymers?
2. How polymers are classified on the basis of their tacticity?
3. Calculate the change in entropy accompanying the isothermal expansion of 4 moles of an ideal gas at 300K until its volume has increased three times.
4. What are the conditions for a process to be spontaneous based on the relation?
 $\Delta G = \Delta H - T\Delta S$.
5. Differentiate between photo-chemical and thermochemical reaction.
6. What is finger print region? Mention its important uses.
7. Calculate the number of phases and components present in the following reaction.
 $\text{MgCO}_{3(s)} \leftrightarrow \text{MgO}_{(s)} + \text{CO}_{2(g)}$
 $\text{NH}_4\text{Cl}_{(s)} \leftrightarrow \text{NH}_{3(g)} + \text{HCl}_{(g)}$
8. What is meant by 18/8 steel?
9. What are nanomaterials?
10. Write any two important applications of gold nanoparticles in medicine.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Describe the free radical mechanism of addition polymerisation with a suitable example. (8)
- (ii) Write the preparation, properties and uses of
- (1) Nylon 6,6
- (2) Epoxy resin. (8)

Or

- (b) (i) Explain the technique, advantages and disadvantages of
- (1) Emulsion polymerization
- (2) Suspension polymerization. (8)
- (ii) Brief about the following properties of the polymers
- (1) Glass Transition Temperature
- (2) Weight average molecular weight. (8)
12. (a) (i) Discuss the criteria for a spontaneous chemical reaction. (8)
- (ii) Derive Van't Hoff isotherm. (8)

Or

- (b) (i) Derive any two Maxwell's relations. (8)
- (ii) Derive Gibbs-Helmholtz equation. (8)
13. (a) (i) What is chemiluminescence? Bring out the mechanism of chemiluminescence. (8)
- (ii) Explain the mechanism of fluorescence and phosphorescence. (8)

Or

- (b) (i) Explain the principle and instrumentation of UV-Visible Spectroscopy with a neat block diagram. (8)
- (ii) Write a notes on the types of transitions involved in organic molecule. (8)
14. (a) (i) Draw a neat one component water system and explain in detail. (8)
- (ii) Discuss in detail the lead silver system. Explain Patinson's process. (8)

Or

- (b) (i) Write a note on heat treatment of steel. (8)
- (ii) Discuss composition, properties and uses of non-ferrous alloys. (8)

15. (a) (i) Describe any two methods of synthesizing carbon nanotubes. (8)
(ii) Distinguish molecules, nanoparticles and bulk materials. (8)

Or

- (b) (i) Discuss the applications of Nano chemistry in biology and medicine. (8)
(ii) Explain about the properties of nanomaterial. (8)

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