

AR18

CODE: 18BST108

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, July-2019

CHEMISTRY

(Common to CE, ME, ECE Branches)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain d-orbitals involving hybridisation with suitable examples 6M
- b) What is meant by variable oxidation state and describe variable oxidation states of (i) Mn (ii) Fe (iii) Co (iv) Ni 6M

(OR)

2. a) Describe postulates and limitation of VSEPR theory 6M
- b) Explain coordination number 3,4 and 6 geometries with examples 6M

UNIT-II

3. a) Explain the terms (i) Auxochrome (ii) Chromophore 6M
- b) Define Infra-red spectroscopy and write a note on finger print region 6M

(OR)

4. a) What are the possible electronic transitions of UV-Visible spectroscopy and its restrictions 6M
- b) Describe theory of NMR spectroscopy and explain NMR signals splitting with suitable examples 6M

UNIT-III

5. a) Explain sacrificial anode protection and impressed current cathode protection methods with neat diagram. 8M
- b) State and explain electrochemical series and its applications 4M

(OR)

6. a) What are the causes of corrosion? Explain electrochemical theory of corrosion by taking Iron as an example 6M
- b) What are the reference electrodes? Describe the construction and working of Calomel electrode 6M

UNIT-IV

7. a) Describe mechanistic pathway of unimolecular and bimolecular elimination reactions with examples 6M
- b) What is polymerization? Discuss the types of polymerization 6M

(OR)

8. a) Explain free radical addition and substitution reactions with examples 8M
- b) What is a Ziegler-Natta catalyst? Explain its role in the synthesis of polymers 4M

UNIT-V

9. a) What is the use of green chemistry approach in organic synthesis 6M
- b) Explain working of Lead Acid storage battery with charging and discharging cell reactions 6M

(OR)

10. a) Explain (i) Photovoltaic technology (ii) Alternative energy resources 8M
- b) Describe major differences between Batteries and Supercapacitors 4M

AR18

CODE: 18BST106

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, July-2019

APPLIED PHYSICS

(Common to EEE, CSE, IT Branches)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain how Newton's rings are formed in the reflected light. Derive an expression for diameters of dark and bright rings. 8
- b) In Newton's rings experiment, the diameter of the 15th ring was found to be 0.59cm and that of the 5th ring was 0.336cm. if the radius of the plano convex lens is 100cm compute the wavelength of light used. 4

(OR)

2. a) Discuss the Fraunhofer diffraction at double slit. Obtain the conditions for principle maxima and minimum. 8
- b) Distinguish between interference and diffraction. 4

UNIT-II

3. a) Explain the different types of optical fibres along with the refractive index profile and mode propagation sketches. 8
- b) Explain the advantages of optical fibers in communications. 4

(OR)

4. a) Obtain the condition for light wave propagation of an optical fiber. 8
- b) Compute the numerical aperture, acceptance angle and critical angle of the fiber having a core refractive index $n_1 = 1.50$ and the refractive index of the cladding $n_2 = 1.45$. 4

UNIT-III

5. a) State and explain Heisenberg uncertainty principle. 3
b) Derive time independent Schrodinger wave equation 9
(OR)
6. a) Explain physical significance of wave function Ψ . 4
b) Derive expressions for wave functions, probability densities and energies for a particle in an infinite potential box. 8

UNIT-IV

7. a) Establish Maxwell's equations for electromagnetic fields. 8
b) What is the Gauss law in magneto statics? 4
(OR)
8. a) State and explain Faraday's law of electro magnetic induction. 8
b) State and explain Ampere's law. 4

UNIT-V

9. a) What is Hall effect? Derive expressions for Hall voltage and Hall coefficient. 8
b) Mention important applications of Hall effect. 4
(OR)
10. a) Derive the carrier concentration in Intrinsic semiconductors. 8
b) Find the diffusion coefficient of electrons in silicon at 300K if μ_e is 0.19 m²/V-s. 4

AR16

CODE: 16BS1003

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, July-2019

ENGINEERING PHYSICS

(Common to CE, EEE & ME Branches)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place.

UNIT-I

1. a) What is principle of superposition? With neat sketch 2+4+4
explain how interference is forming from thin films in
reflected light. Derive condition for formation of maximum
and minimum.
b) What are application of interference and explain them. 4
(OR)
2. a) In a Newton rings Experiment the diameter of the 15th ring 4
is 0.59 cm and that of 5th is 0.336 cm. If the radius of
curvature of lens is 100cm find the wavelength of the
source.
b) By deriving mathematical expressions explain intensity 10
pattern in single slit Fraunhofer diffraction.

UNIT-II

3. a) What is population inversion and explain it? Illustrate the 10
construction and working of He-Ne laser.
b) Write any four differences between stimulated emission and 4
spontaneous emission.
(OR)
4. a) Write differences between single mode fiber and multimode 4
fiber.
b) Explain the terms numerical aperture and acceptance angle of 10
an optical filter and derive expressions for them.

UNIT-III

5. a) What is Heisenberg uncertainty principle? And explain nonexistence of electron in nucleus. 3+3
b) Derive Schroedinger time independent wave equation. 8
(OR)
6. a) Derive energy states and wave functions of a particle in one dimensional box and show that the lowest energy is not equal to zero. 8
b) Compare Maxwell Boltzmann, Bose Einstein and Fermi Dirac Statistics at least in two aspects. 6

UNIT-IV

7. a) What is the origin of magnetic moment in atoms? What is Bohr magneton? Derive expression for orbital magnetic moment and spin magnetic moment. 2+3+7
b) Define Magnetic Susceptibility. 2
(OR)
8. a) Compare properties of soft and hard magnetic materials. 6
b) What are eddy current losses in transformers and explain how it can be eliminated. Write relation between B, H and I, and explain terms B, H and I. 5+3

UNIT-V

9. a) Explain dielectric losses and dielectric breakdown. 6
b) Explain dielectric heating. Give examples and discuss about the solid and the liquid dielectric materials. 4+4
(OR)
10. a) What is ferroelectricity? Explain spontaneous polarization in Barium Titanate Crystal at different temperatures. 3+5
b) Define and explain permeability and susceptibility in magnetism. 3+3

AR16

CODE: 16BS1004

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, July-2019

ENGINEERING CHEMISTRY

(Common to ECE, CSE & IT Branches)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place.

UNIT-I

- | | | |
|-------------|---|-----|
| 1. a) | Explain in detail about setting and hardening of cement with chemical reactions | 6 M |
| b) | Give the details of manufacturing of Portland cement with a neat sketch | 8M |
| (OR) | | |
| 2. a) | Define polymer, polymerization, functionality and degree of polymerization | 8M |
| b) | With a neat sketch discuss injection moulding of plastics | 6M |

UNIT-II

- | | | |
|-------------|---|----|
| 3. a) | Explain sedimentation, filtration, coagulation and chlorination | 8M |
| b) | Write the various units of hardness of water and the relation between them. | 6M |
| (OR) | | |
| 4. a) | What is hardness of water? Explain how it is determined by EDTA method | 8M |
| b) | Give a short note on break point chlorination | 6M |

UNIT-III

- | | | |
|-------------|--|----|
| 5. a) | With neat diagrams explain galvanic corrosion and pitting corrosion. | 8M |
| b) | Why always large anode and small cathode is preferred in corrosion control? | 6M |
| (OR) | | |
| 6. a) | With suitable chemical equations discuss the mechanism of chemical corrosion | 8M |
| b) | Write a note on impressed current cathodic protection | 6M |

UNIT-IV

- | | | |
|-------------|--|----|
| 7. a) | How synthetic petrol is manufactured from Fischer-Tropsch process? | 8M |
| b) | What are octane and cetane numbers? Explain their significance. | 6M |
| (OR) | | |
| 8. a) | What are lubricants? Explain the various types of mechanism of lubrications. | 8M |
| b) | Discuss any three properties of lubricants. | 6M |

UNIT-V

- | | | |
|-------------|--|----|
| 9. a) | What is electrode potential? Derive an expression for the determination of electrode potential | 8M |
| b) | With a neat sketch explain the construction and working of NHE | 6M |
| (OR) | | |
| 10. a) | Explain the construction and working photovoltaic cell with a neat sketch. | 8M |
| b) | What is greenhouse effect? Explain the causes and consequences of greenhouse effect. | 6M |

AR13

CODE: 13BS1005 **SET-1**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, July-2019
ENGINEERING CHEMISTRY
(Common to CE, ME, CSE & IT Branches)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What is a copolymer?
- b) Write the role of gypsum in setting of cement.
- c) Define coagulation.
- d) Write units of hardness of water.
- e) Write the importance of galvanic series
- f) What is dry corrosion?
- g) What is meant by octane number?
- h) Write the importance of aniline point of a lubricant.
- i) Give examples for green house gases.
- j) What are nanomaterials?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Write the differences between thermosetting and thermoplastic polymers.
 - b) Discuss wet and dry process of manufacture of Portland cement. (6+6)
- (OR)
3. a) Discuss any two techniques for moulding of plastics.
 - b) Explain the preparation, properties and applications of Bakelite. (6+6)

UNIT-II

4. a) Explain ion exchange method for softening of water. Mention advantages of this method.
- b) Calculate the temporary and permanent hardness of water containing the following impurities $\text{Mg}(\text{HCO}_3)_2 = 146 \text{ ppm}$, $\text{Ca}(\text{HCO}_3)_2 = 81 \text{ ppm}$, $\text{MgCl}_2 = 190 \text{ ppm}$, $\text{CaCl}_2 = 91 \text{ ppm}$, $\text{NaCl} = 75 \text{ ppm}$. (7+5)

(OR)

5. a) Explain zeolite method for softening of water.
b) Discuss estimation of hardness of water by EDTA method. (6+6)

UNIT-III

6. a) Explain mechanism of electrochemical corrosion of iron in neutral solution.
b) What are corrosion inhibitors? Explain their mode of action. (6+6)
- (OR)
7. a) Explain i) Galvanic corrosion ii) Concentration cell corrosion
b) Discuss any two methods for prevention of corrosion. (6+6)

UNIT-IV

8. a) Discuss any one method for the preparation of synthetic petrol.
b) Explain the mechanism of Extreme pressure lubrication. (6+6)
- (OR)
9. a) Explain the significance of Viscosity and neutralization number of lubricants.
b) Explain in detail the fixed bed catalytic cracking. (6+6)

UNIT-V

10. a) Give an account of different methods by which solar energy can be harnessed.
b) Write notes on i) Carbon Nano tubes II) Fullerenes (6+6)
- (OR)
11. a) Discuss the principles of green synthesis.
b) Discuss any three preparation methods for the synthesis of nano materials. (6+6)