

# AR18

**CODE: 18BST108**

**SET-1**

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

**I B.Tech II Semester Regular Examinations, April- 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) What is hybridisation and explain s-, p- orbital involve hybridisations with examples 6M
- b) Write molecular orbital configuration and bond order of (i) CO and (ii) O<sub>2</sub> 6M

**(OR)**

2. a) Explain hybridisation and geometry of XeF<sub>2</sub>, XeF<sub>4</sub> and XeF<sub>6</sub> with help of VSEPR theory 6M
- b) Describe ionisation potential and what are the factors governing ionization potential 6M

### **UNIT-II**

3. a) Explain any three spectroscopic techniques. 6M
- b) Discuss different types of infra-red molecular vibrations 6M

**(OR)**

4. a) Explain difference between fluorescence and phosphorescence with electronic excitation 6M
- b) Define the term chemical shift and describe factors affecting chemical shift 6M

### **UNIT-III**

5. a) Define corrosion? Explain various types of corrosion process 8M
- b) Explain the following factors affecting the rate of corrosion (i) Nature of corrosive environment (ii) Ratio of anodic to cathodic area 4M

**(OR)**

6. a) What is meant by single electrode potential? How is electrode potential determined using SHE 6M
- b) What is cathodic protection? Explain the sacrificial anode method and impressed current method 6M

### **UNIT-IV**

7. a) Define electrophile and nucleophile? Discuss electrophilic and nucleophilic substitution reactions with suitable examples 8M
- b) What is degree of polymerization? Explain classification of polymers 4M

**(OR)**

8. a) Describe rearrangement mechanisms of (i) pinacol-pinacolone (ii) Claisen 6M
- b) Explain (i) Elimination unimolecular conjugate base reaction (ii) Cis-Trans isomerism 6M

### **UNIT-V**

9. a) Explain the principles of Green chemistry. 8M
- b) Write any four differences between batteries and Supercapacitors. 4M

**(OR)**

10. a) Write a note on working of concentrated solar power systems 6M
- b) Describe construction and working of alkaline battery 6M

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 Young's double slit experiment on the basis of wave theory. Derive an expression for fringe width. 8M  
b) Define interference. List the conditions for getting sustained interference. 4M
- (OR)**
2. a) Obtain the condition for central maxima in Fraunhofer diffraction due to a single slit. 8M  
b) List any four differences between interference and diffraction. 4M

**UNIT-II**

3. a) Explain the principle and construction of an optical fibre. 8M  
b) A step index fibre has a core of refractive index 1.5. If the NA of the fibre is 0.26, calculate the refractive index of the cladding material. 4M
- (OR)**
4. a) Provide a detailed description of an optical fibre based communication system using a block diagram. 8M  
b) The numerical aperture of an optical fibre is 0.39. If the difference in the refractive indices of the material of its core and the cladding is 0.05, calculate the refractive index of material of the core. 4M

**UNIT-III**

5. a) Explain the concept of wave particle duality and obtain an expression for the wavelength of the matter waves. 8M  
b) Calculate the velocity and kinetic energy of an electron of wavelength  $1.66 \times 10^{-10}$  m. 4M
- (OR)**
6. a) Derive the time independent Schrödinger wave equation. 8M  
b) Explain the significance of the wave function. 4M

**UNIT-IV**

7. a) State and prove Gauss's law in electrostatics. 8M  
b) If a point charge q is placed at the centre of a cube what is the flux linked a) With the cube? b) With each face of the cube? 4M
- (OR)**
8. a) Write Maxwell's equations in integral form. 8M  
b) Write the Faraday's laws of electromagnetic induction. 4M

**UNIT-V**

9. a) Derive an expression for electron concentration for an intrinsic semiconductor. 8M  
b) Find the diffusion coefficient of electrons in silicon at 300 K if  $\mu_e$  is  $0.19 \text{ m}^2/\text{Vs}$ . 4M  
Given that  $k = 1.38 \times 10^{-23} \text{ J/K}$ .
- (OR)**
10. a) Obtain an expression for Hall coefficient for an extrinsic semiconductor. 8M  
b) The Hall coefficient of a specimen is  $3.66 \times 10^{-4} \text{ m}^3\text{C}^{-1}$ . Calculate its carrier density. 4M

# RA / AR18

**CODE: 18BST107**

**SET-2**

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

**I B.Tech II Semester Regular Examinations, April-2019**

## **ENGINEERING PHYSICS (Civil Engineering Branch)**

**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) Express the various forces to which a damped oscillator is subjected to. Derive its differential wave equation. 7M  
b) Explain critically damped oscillation with example 5M  
(OR)
2. a) What are forced oscillations? Give examples. Explain how resonance is a special kind of force oscillation. 9M  
b) Explain Quality factor. 3M

### **UNIT-II**

3. a) Explain the formation of Newton rings by reflection and derive the expressions for diameters of dark and bright rings . 8M  
b) Newton rings formed by sodium light between flat glass plate and a convex lens are viewed normally. What will be the order of dark ring which will have double the diameter of that of 40<sup>th</sup> ring. 4M  
(OR)
4. a) Define diffraction of light and give its classification. 4M  
b) Explain Fraunhofer diffraction due to double slit arrangement. 8M

### **UNIT-III**

5. a) Distinguish between spontaneous and stimulated emissions. 4M  
b) Explain the importance of Population inversion and optical feedback in laser systems. 8M  
(OR)
6. a) Explain the construction and working of semiconductor laser and give its applications. 9M  
b) Give some industrial applications of Lasers. 3M

### **UNIT-IV**

7. a) Define acceptance angle. Derive the expression for numerical aperture of optical fibre. 8M  
b) Define critical angle. A silica optical fibre has a core refractive index of 1.5 and cladding of refractive index 1.47. Calculate the critical angle at core clad interface. 4M  
(OR)
8. a) Discuss the fibre optics communication system with a neat block diagram. 8M  
b) What is the difference between single mode and multimode fibres. 4M

### **UNIT-V**

9. a) Explain how diamagnetism and paramagnetism arises in materials. 6M  
b) Write a short notes on Ferrites. 6M  
(OR)
10. a) Define superconductivity and distinguish Type-I and Type-II superconductors. 8M  
b) Explain Meissner effect. 4M

# AR16

**CODE: 16BS1003**

**SET-2**

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

**I B.Tech II Semester Supplementary Examinations, April-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) Describe how you would use Newton's rings to determine the wavelength of a monochromatic light and derive the relevant formula. 8M
- b) Write a note on colours of thin films. 3M
- c) In Newton's ring experiment, the diameter of 10<sup>th</sup> dark ring formed by yellow sodium light of wavelength 5890 Å and seen in reflection is 3mm. What is the radius of curvature of lens surface? 3M

**(OR)**

2. a) What is diffraction of light? Discuss the Fraunhofer diffraction due to single slit. 10M
- b) Calculate the angular separation between the first order minima on either side of central maximum when the slit is  $6 \times 10^{-4}$  cm width and light illuminating it has a wavelength 6000 Å. 4M

## **UNIT-II**

3. a) What are the characteristics of a laser beam? 2M
- b) Describe the construction and working of He-Ne laser with an energy level diagram. 8M
- c) Mentions some of the applications of lasers in industry and medical fields. 4M

**(OR)**

4. a) Describe the structures of different types of optical fibers along with light ray propagation paths. 10M
- b) Explain the advantages of optical communication system. 4M

### UNIT-III

5. a) Derive Schrödinger time independent wave equation. Write the physical significance of wave function. 10M  
b) A nucleus (neutron or proton) is confined to nucleus of radius  $5 \times 10^{-15}$  m. Calculate the minimum uncertainty in the momentum of the nucleon. Also calculate the minimum kinetic energy of the nucleon. (mass of neutron =  $1.67 \times 10^{-27}$  kg, Planck's constant =  $6.62 \times 10^{-34}$  joule.sec). 4M
- (OR)**
6. a) Obtain an expression for the energy of a particle in one dimensional potential well using Schrödinger time independent wave equation 10M  
b) Distinguish between Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics. 4M

### UNIT-IV

7. a) Distinguish between the ferro, antiferro and ferri magnetic materials. 4M  
b) Explain the domain theory of ferromagnetism. 6M  
c) Write a short note on eddy current losses. 4M
- (OR)**
8. a) Define the terms magnetic susceptibility, magnetic permeability and magnetization. 6M  
b) Describe the hysteresis loop. Distinguish between soft and hard magnetic materials. 8M

### UNIT-V

9. a) Describe about the solid and liquid insulating materials. 6M  
b) What is a ferroelectric material? Describe the spontaneous polarization in barium titanate. 8M
- (OR)**
10. a) Explain about the different types of breakdowns in dielectric materials. 8M  
b) Explain the electronic polarizability in atoms and obtain an expression for electronic polarizability in terms of radius of the atom. 6M

# AR16

**CODE: 16BS1004**

**SET-2**

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

**I B.Tech II Semester Supplementary Examinations, April-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 addition polymerization and condensation polymerization with suitable examples. 6M
  - b) Explain the following fabrication techniques with a neat sketch 8M
    - i) Transfer moulding
    - ii) Injection moulding
- (OR)**
2. a) What is the role of gypsum in the Portland cement? Write a brief account on setting and hardening of Portland cement. 7M
  - b) Describe the various steps involved in the manufacture of Portland cement by wet process. 7M

## **UNIT-II**

3. a) Give an account on ion exchange process for the external treatment of boiler feed water with a neat sketch. 8M
  - b) Describe Electrodialysis method for desalination of brackish water with a neat sketch. 6M
- (OR)**
4. a) Write a note on temporary hardness of water. How is it removed? Give the related equations. 4M
  - b) Describe the cold lime soda process of softening boiler feed water with a neat diagram. 7M
  - c) Give any three units in which hardness of water is expressed. 3M

## **UNIT-III**

5. a) Define corrosion. Explain the mechanism of wet or electro chemical corrosion. 10M
- b) Explain Sacrificial anodic protection method. 4M

**(OR)**

6. a) Explain how the nature of metal influence the rate of corrosion. 4M  
b) Explain the following 10M  
i) Differential aeration corrosion ii) Stress corrosion

**UNIT-IV**

7. a) Explain Bergius process for synthesis of petrol with a neat sketch. 8M  
b) What is petrol knocking? What is octane rating of petrol and mention any two anti-knocking agents? 6M

**(OR)**

8. a) Explain the mechanism of thick film lubrication. 6M  
b) Explain the following properties of a lubricant 8M  
i) Flash point and Fire point ii) Mechanical Strength

**UNIT-V**

9. a) What is a reference electrode? Give the construction and working of calomel electrode. 8M  
b) What is electrochemical series? Give its applications. 6M

**(OR)**

10. a) Write a note on greenhouse concepts. 4M  
b) Explain how do you convert solar energy into electrical energy by using the following 10M  
i) Photo voltaic cell ii) Solar dish

# AR13

CODE: 13BS1005 **SET-2**  
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

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

ENGINEERING CHEMISTRY  
(Common to CE, ME, CSE & IT)

Time: 3 Hours

Max Marks: 70

## PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Give an example for each thermosetting and thermoplastic polymer.
- b) Define hardening of cement.
- c) Write various units of hardness of water.
- d) What is desalination of brackish water?
- e) Define corrosion.
- f) Name any two corrosion inhibitors.
- g) What is refining of petroleum?
- h) Define flash point of a lubricant.
- i) Write any two applications of green chemistry
- j) Give the application of gold nano particles

## PART-B

Answer one question from each unit

[5x12=60M]

### UNIT-I

2. a) Discuss any two moulding methods of plastics. 6M
- b) Write the preparation, properties and applications of Bakelite and nylon 6M

(OR)

3. a) Write the differences between addition and condensation polymers. 8M
- b) Write the raw materials used in Portland cement 4M

### UNIT-II

4. a) Explain in detail about lime soda process of softening of hard water. 8M
- b) Define hardness. Write the classification of hardness. Write its units. 4M



**(OR)**

5. a) Explain the estimation of hardness by EDTA method. 8M  
b) Write a note on break point chlorination. 4M

**UNIT-III**

6. a) Briefly explain any four factors that affect the rate of corrosion. 8M  
b) What is galvanic series? Write its significance. 4M

**(OR)**

7. a) Explain the mechanism of dry corrosion with suitable equations. 6M  
b) Write a note on corrosion control by modifying the environment. 6M

**UNIT-IV**

8. a) With a neat sketch explain moving bed catalytic cracking. 8M  
b) What is cetane number? Write its significance. 4M

**(OR)**

9. a) Explain any four properties of lubricants. 8M  
b) Discuss the thin film mechanism of lubrication. 4M

**UNIT-V**

10. a) Write a detailed note on concentrated solar power plants. 8M  
b) Give any two applications of nano materials 4M

**(OR)**

11. a) Write the principles of green chemistry 8M  
b) Discuss any one method of synthesis of CNT's. 4M

# AR13

CODE: 13BS1004

**SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

**I B.Tech II Semester Supplementary Examinations, April-2019**

**ENGINEERING PHYSICS**  
(Common to EEE & ECE)

**Time: 3 Hours**

**Max Marks: 70**

**PART-A**

**ANSWER ALL QUESTIONS**

**[1 x 10 = 10 M]**

- 1.a) What is the coherence of light waves?
- b) What are the conditions of light sources to produce interference?
- c) What is meta stable state?
- d) Why the refractive index of core is always greater than cladding in optical fibers?
- e) Sketch the following atomic planes in a simple cubic structure (110), (111).
- f) Write lattice parameters of orthorhombic crystal system
- g) What is spontaneous magnetization?
- h) What is Ferro electricity?
- i) How matter waves are different from electromagnetic waves?
- j) What is the minimum energy of an electron bound in potential box of length  $1 \times 10^{-10} \text{m}$ ?

**PART-B**

**Answer one question from each unit**

**[5x12=60M]**

**UNIT-I**

- 2.a) What is interference? Explain
  - b) With neat diagram explain the formation of Newton's rings and find the diameters of bright & dark rings **[2M+10M]**
- (OR)**
3. Give the theory of Fraunhofer diffraction due to single slit and hence obtain the condition for primary and secondary maxima. Using this obtain intensity distribution curves **[12M]**

## **UNIT-II**

- 4.a) Write the differences between spontaneous and stimulated emission of radiation
- b) With neat diagram explain the construction and working of He-Ne laser [4M+8M]

**(OR)**

- 5.a) Explain the construction and working principle of an optical fiber
- b) Explain types of optical fibers with ray propagation diagrams [6M+6M]

## **UNIT-III**

6. Show that FCC is the most closely packed structure of the three cubic structures by working out their packing factors. [12M]

**(OR)**

7. a) Derive Bragg's of X-ray diffraction and write its applications
- b) The Bragg's angle for reflection from the (111) plane in an FCC crystal is  $19.2^\circ$  for an X-ray wavelength of  $1.54\text{\AA}$ . Compute the cube edge of the unit cell. [7M+5M]

## **UNIT-IV**

8. a) What is hysteresis curve of ferro magnetism? Explain
- b) Write the differences between soft and hard magnetic materials [6M+6M]

**(OR)**

- 9.a) Define terms Polarizability and Polarization vector
- b) Explain Ionic polarization in dielectrics [4M+8M]

## **UNIT-V**

10. Derive an expression for electrical conductivity on the basis of free electron theory and how is it related to mobility [12M]

**(OR)**

- 11.a) Explain the significance of wave function,  $\Psi$
- b) Show that the energy of an electron is quantized in the potential box [4M+8M]