

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I B.Tech II Semester Supplementary Examinations, February-2022****CHEMISTRY****(Common to CE, EEE & ECE)****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) Define temporary and permanent hardness of water and mention which constituents are responsible for it. How to determine permanent hardness in water by EDTA method? 6M
- b) One litre ground water sample having the following compositions in ppm units. $\text{Ca}(\text{HCO}_3)_2 = 24.3$, $\text{CaCl}_2 = 16.6$, $\text{MgSO}_4 = 18$ and $\text{NaCl} = 5.85$. Calculate temporary and permanent hardness of water 4M

(OR)

2. a) Explain the procedure for getting of softening water by ion exchange process. List out any two advantages of this method compared to zeolite method 6M
- b) Discuss briefly any four disadvantages of hard water 4M

UNIT-II

3. a) What is spectroscopy and electronic transition ? 4M
- b) Explain various types of stretching and bending vibrations in IR spectroscopy. 6M

(OR)

4. a) What is the working principle involved in NMR spectroscopy and what is an equivalent proton? 4M
- b) Explain the terms Chemical shift and Coupling constant. 6M

UNIT-III

5. a) List out any four differences between thermoplastics and thermosetting plastics 4M
- b) Suggest and explain best moulding method in the fabrication of plastic sitting chair 6M

(OR)

6. a) Write about the preparation, properties and engineering applications of PVC polymer 6M
- b) Define polymer and polymerization. List out any four advantages of polymers over metals and alloys 4M

UNIT-IV

7. a) Explain the reaction and mechanism of Claisen rearrangement. 6M
- b) Explain SN^1 mechanism with example 4M

(OR)

8. a) Explain the reaction and mechanism of Pinacol Pinacolone rearrangement 6M
- b) Explain SN^2 mechanism with example 4M

UNIT-V

9. a) Suggest and explain suitable corrosion mechanism, if an Iron rod is continuously exposed to sea water 6M
- b) How the factors like nature of oxide and solubility of corrosion products to influence the rate of corrosion in metals? 4M

(OR)

10. a) Which metallic coating is good in the aspect of prevention of corrosion on metallic surface? Justify your answer 4M
- b) Explain in detail how the underground Iron pipe line is protected against corrosion 6M

UNIT-VI

11. a) Write any six principles followed in green chemistry 6M
- b) Write any four differences between primary and secondary batteries 4M

(OR)

12. a) Explain the construction and working of lead acid battery with discharging and charging reactions 6M
- b) Explain briefly how the solar energy is convert into electrical energy 4M

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 are the characteristics of Simple Harmonic Oscillator? 5M
b) Derive Differential Equation of Wave Motion 5M

(OR)

2. a) What are forced oscillations? Obtain an expression for the amplitude of forced oscillations. 6M
b) Explain resonance and quality factor. 4M

UNIT-II

3. a) What is the interference of light waves? 2M
b) With ray diagram discuss the theory of thin films and the condition for constructive and destructive interference in the case of reflected system. 8M

(OR)

4. a) What are the difference between interference and diffraction? 3M
b) Obtain the condition for primary maximum, Secondary minima and maxima in Fraunhofer diffraction due to single slit. 7M

UNIT-III

5. a) With the help of suitable diagrams, explain the principle, construction and working of a Ruby laser. 8M
b) Mention Merits and demerits of Ruby laser 2M

(OR)

6. a) Describe the Principle of Laser. Explain the characteristics of a Laser beam. 5M
b) Mention the applications of Laser each in the field of scientific research, industry and medicine. 5M

UNIT-IV

7. a) Write differences between Step Index & Graded index optical fibers. 5M
b) Differences between Single Mode Fibers and Multimode Fibers 5M

(OR)

8. a) Derive an expression for acceptance angle for an optical fiber. 7M
b) Calculate the numerical aperture and acceptance angle for an optical fiber with core and cladding refractive indices being 1.48 and 1.45 respectively. 3M

UNIT-V

9. a) Define Unit cell 2M
b) Show that FCC is closely packed than SC, BCC by working out the packing factors. 8M

(OR)

10. a) Explain the terms, (i) Free Volume (ii) Lattice Parameters (iii) Unit Cell and (iv) Primitive Cell 8M
b) Give packing Fraction values for SC, BCC & FCC 2M

UNIT-VI

11. a) Write the properties of Anti ferro and ferri magnetic materials 5M
b) Differentiate the Soft and Hard Magnetic Materials 5M

(OR)

12. a) Explain the Meissner Effect 4M
b) Distinguish between Type-I & Type-II Superconductors 6M

Time: 3 Hours**Max Marks: 60**

Answer ONE Question from each Unit

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All parts of the Question must be answered at one place

UNIT-I

1. a) Derive an expression for condition of maximum and minima for reflected light in case of thin transparent film of uniform thickness 7M
- b) A parallel beam of light ($\lambda=5890\text{\AA}$), is incident on a glass plate ($\mu=1.50$) such that angle of refraction into plate is 60° . Calculate the smallest thickness of the plate which will make it appear dark by reflection 3M

(OR)

2. Obtain the condition for primary maxima in Fraunhofer diffraction due to single slit and derive an expression for width of the central maxima 10M

UNIT-II

3. a) Describe the construction and working of Ruby Laser 7M
- b) Write the merits and demerits of Ruby Laser 3M

(OR)

4. a) Distinguish between Spontaneous and stimulated emissions 5M
- b) Explain the characteristics of Laser beam 5M

UNIT-III

5. a) With a neat diagram, explain the structure of an optical fiber. 4M
- b) Comment on single mode and multimode fibres. 6M

(OR)

6. a) Explain the principal of optical fiber as a wave guide for light. Using ray theory, derive the condition for transmission of light with in optical fiber 6M
- b) Mention Advantages of optical fibers 4M

UNIT-IV

7. a) Define Wave Function? What are the limitations? 4M
- b) Derive the time dependent Schrodinger wave equation. 6M

(OR)

8. Show that the energies of a particle in a potential box are quantized 10M

UNIT-V

9. a) State and explain Lenz's law in electrostatics 2M
- b) Derive an expression for electric field in a vacuum from appropriate Maxwell equations 8M

(OR)

10. a) Define electric field intensity. With the application of Gauss law obtain an expression for electric field intensity at a point which is at a distance 'R' from a point charge Q. 7M
- b) State and explain Biot-Savart law. 3M

UNIT-VI

11. a) What do you understand by drift and diffusion currents in the case of a semiconductor? 6M
- b) Deduce Einstein's Relations. 4M

(OR)

12. What is Hall Effect? Obtain an expression for Hall voltage and Hall coefficient. 10M

