# AR18

**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) | Describe how molecular orbital theory is helpful in predicting bond order and hence the bond strength of the bonds between atoms. | 8M |
| | b) | What is electronegativity? Can it effect the bond angle in a molecule? | 4M |

**(OR)**

| | | | |
|---|---|---|---|
| 2. | a) | Discuss the shapes of $NH_3$ and $H_2O$ molecules on the basis of VSEPR theory. | 8M |
| | b) | Briefly explain about variable oxidation states. | 4M |

## UNIT-II

| | | | |
|---|---|---|---|
| 3. | a) | By make use of Jablonski diagram explain fluorescence and phosphorescence. | 8M |
| | b) | Discuss the importance of finger print region in IR spectroscopy. | 4M |

**(OR)**

| | | | |
|---|---|---|---|
| 4. | a) | Explain about chromophores and auxochromes with examples. | 6M |
| | b) | What is chemical shift? Explain the concept of splitting in NMR. | 6M |

## UNIT-III

| | | | |
|---|---|---|---|
| 5. | a) | Illustrate the construction and working of Calomel reference electrode. | 6M |
| | b) | Discuss the role of proper designing and modifying the environment in prevention of corrosion. | 6M |

**(OR)**

| | | | |
|---|---|---|---|
| 6. | a) | Explain the electrochemical theory of corrosion while the metal is in absorption of oxygen condition. | 6M |
| | b) | Explain the protection of metals by sacrificial anode with an example. | 6M |

## UNIT-IV

| | | | |
|---|---|---|---|
| 7. | a) | Explain Diels-Alder reaction with an example. | 4M |
| | b) | Discuss classification of polymers. | 8M |

**(OR)**

| | | | |
|---|---|---|---|
| 8. | a) | Illustrate $S_N1$ mechanism. | 6M |
| | b) | Explain $E_1$ elimination reaction. | 6M |

## UNIT-V

| | | | |
|---|---|---|---|
| 9. | a) | Explain the construction and working of alkaline battery. | 6M |
| | b) | Distinguish between super capacitors and batteries. | 6M |

**(OR)**

| | | | |
|---|---|---|---|
| 10. | a) | Discuss any six principles of green chemistry. | 6M |
| | b) | Illustrate the working of Solar dish collector. | 6M |

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# AR18

CODE: 18BST106                                                     SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
(AUTONOMOUS)
**I B.Tech II Semester Supplementary Examinations, February, 2022**
**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)  What is the principle of superposition? obtain the expression for maxima and minima conditions for interference in thin films?    8M
    b)  Distinguish between Franhoffer and Fresnel diffraction?    4M
    **(OR)**
2.  a)  obtain the condition for primary maxima in Fraunhofer diffraction due to single slit.    8M
    b)  A parallel beam of light ($\lambda$ = 5890 X $10^{-8}$ cm) is incident on a thin glass plate ($\mu$=1.5) such that the angle of refraction into the plate is $60^0$.Compute the smallest thickness of the glass plate which will appear dark by reflection.    4M

## UNIT-II

3.  a)  Obtain expression for Numerical aperture of an optical fiber    8M
    b)  Find the numerical aperture and acceptance angle of a fibre core with refractive index 1.4 and fractional change in refractive index $\Delta$ = 0.03.    4M
    **(OR)**
4.  a)  What is the principle behind propagation of light in optical fibers.    4M
    b)  Discuss the types of optical fibers based on refractive index profile.    8M

## UNIT-III

5.  a)  Derive the time independent Schrodinger's equation for a free particle.    8M
    b)  What are matter waves? Explain their properties.    4M
    **(OR)**
6.  a)  Show that the energy of the particle is quantized in a potential box    8M
    b)  Derive the equation for the De broglie's wavelength for an electron accelerated through a potential difference V volts.    4M

## UNIT-IV

7.  a)  Derive Gauss law for electric fields.    8M
    b)  Describe magnetic force acting on a current carrying coil.    4M
    **(OR)**
8.  a)  Explain Biot - Savart law and Ampere's law.    8M
    b)  List out the applications of Maxwell's equations.    4M

## UNIT-V

9.  a)  Describe the drift and diffusion currents in a semiconductor and derive their expressions.    8M
    b)  The mobility of electrons and holes in an intrinsic semiconductor are 0.38 and $0.16 m^2/V-s$. Find the intrinsic conductivity if $n_i = 2.3 \times 10^{19}/m^3$.    4M
    **(OR)**
10. a)  Show that Fermi level in intrinsic semiconductor is $E_i = \dfrac{E_C + E_V}{2}$    8M
    b)  Distinguish between direct and indirect band gap semiconductors.    4M

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CODE: 16BS1004                                                                 SET-2
## ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
### (AUTONOMOUS)
**I B.Tech II Semester Supplementary Examinations, February, 2022**
### ENGINEERING CHEMISTRY
**(Common to CE, EEE & ME Branches)**

Time: 3 Hours                                                          Max Marks: 70M

Answer ONE Question from each Unit
All parts of the question must be answered in one place only

### UNIT-I

| | | | |
|---|---|---|---|
| 1. | a | Differentiate between Thermoplastics and thermosetting plastics? | **7M** |
| | b | Explain the manufacture of cement by any one method? | **7M** |

**(OR)**

| | | | |
|---|---|---|---|
| 2. | a | Differentiate between Addition and condensation polymerization process with very good number of examples? | **7M** |
| | b | Discuss Setting and Hardening of cement using various Reactions? | **7M** |

### UNIT-II

| | | | |
|---|---|---|---|
| 3. | a | Discuss cold and hot lime soda process of water softening with neat diagrams? | **10M** |
| | b | Write the chemical reactions involved in Estimation of water hardness by EDAT? | **4M** |

**(OR)**

| | | | |
|---|---|---|---|
| 4. | a | Explain zeolite process of water softening with neat diagram? | **7M** |
| | b | Explain Ion Exchange process of water softening with neat diagram? | **7M** |

### UNIT-III

| | | | |
|---|---|---|---|
| 5. | a | When you look at several older cars that are showing initial signs of rust formation, where do you expect to find the most rust? What does this observation imply about conditions that lead to corrosion.Discuss MECHANISM. | **9M** |
| | b | Explain what type of corrosion occurs when Screw & washer are made of different metals? | **5M** |

**(OR)**

| | | | |
|---|---|---|---|
| 6. | a | **Illustrate** with the aid of label diagrams that show how a (i) Magnesium Bar and (ii) D.C Electrical power supply could be used to prevent or at least decrease the extent of corrosion of a steel underground tank used for storing diesel fuel? | **10M** |
| | b | Explain how corrosion can be considered as extractive metallurgy in reverse. | **4M** |

### UNIT-IV

| | | | |
|---|---|---|---|
| 7. | a | Distinguish between 'cracking' and 'reforming'. What is the purpose of these operations? | **7M** |
| | b | What are the functions of lubricants? | **7M** |

**(OR)**

| | | | |
|---|---|---|---|
| 8. | a | Describe one method of thermal cracking of petroleum fractions and point out a feasible mechanism for the process | **7M** |
| | b | Write a brief note on extreme pressure lubrication? | **7M** |

### UNIT-V

| | | | |
|---|---|---|---|
| 9. | a | Draw a fully labelled diagram showing how you could measure the $E^0$ value for the $Mg^{2+}/Mg$ system using a standard hydrogen electrode. Your diagram should show all the essential conditions for the experiment. (The $Mg^{2+}/Mg$ system means having magnesium metal in contact with $Mg^{2+}$ions.). How would you modify the experiment to find the $E^0$ value for the $Ag^+/Ag$ system? By considering the values obtained, explain which of the two metals, magnesium or silver, more readily forms positive ions in solution. | **10M** |
| | b | The cost of electricity generated by solar thermal power plants currently is greater than that of electricity produced by burning fossil fuels. Given this economic fact, suggest some strategies that might be used to promote the use of environmentally cleaner electricity from photovoltaics | **4M** |

**(OR)**

| | | | |
|---|---|---|---|
| 10. | a | Discuss the construction and working of SHE and calomel electrode. | **10M** |
| | b | Discuss the construction and working of Photovoltaic cell. | **4M** |

# AR16

## ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
### (AUTONOMOUS)
### I B.Tech II Semester Supplementary Examinations, February, 2022
## ENGINEERING PHYSICS
### (Common to CE, EEE & ME Branches)

Time: 3 Hours                                                    Max Marks: 70M

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

### UNIT-I

1. a) What is the principle of superposition? obtain the expression for maxima and minima conditions for interference in thin films? **10 M**
   b) In Newton's rings experiment, the diameter of the 15$^{th}$ ring was found to be 0.59cm and that of the 5$^{th}$ ring was 0.336cm. if the radius of the plano convex lens is 100cm, compute the wavelength of light used. **4 M**

(OR)

2. a) How diffraction is different from interference? **4 M**
   b) obtain the condition for primary maxima in Fraunhofer diffraction due to single slit. **10 M**

### UNIT-II

3. a) Explain the construction and working of He-Ne Laser? **10 M**
   b) Write applications of Lasers in Industry and Medical Fields. **4 M**

(OR)

4. a) Obtain expression for Numerical aperture of an optical fiber **10 M**
   b) Calculate the numerical Aperture and Acceptance angle for an optical fiber with core and cladding refractive indices being 1.58 and 1.55 respectively. **4 M**

### UNIT-III

5. a) Derive the time independent Schrodinger's equation for a free particle. **6 M**
   b) Explain the Physical significance of wave function. **4 M**
   c) An electron is confined in one-dimensional potential well of width 1 x 10$^{-10}$m. Find the energy of electron when it is in the ground state. **4 M**

(OR)

6. a) Show that the energy of the particle is quantized in a potential box **10 M**
   b) Compare Maxwell Boltzmann, Bose Einstein and Fermi Dirac Statistics Qualitatively? **4 M**

### UNIT-IV

7. a) What is the origin of magnetic momentum explain? **8 M**
   b) On the basis of domain theory explain the hysteresis curve? **6 M**

(OR)

8. a) Classify magnetic materials into Dia, Para and Ferro magnetic materials **6 M**
   b) Show that B= $\mu_0$ (H+M) **4 M**
   c) Distinguish between soft and hard magnetic materials? **4 M**

### UNIT-V

9. a) Obtain an expression for electronic polarizability of an atom? **10 M**
   b) What are the applications of dielectrics? **4 M**

(OR)

10. a) What is Ferro Electricity? explain Spontaneous Polarization in Barium Titanate Crystal **8 M**
    b) Explain the frequency dependence of total polarizability? **6 M**