

# AR16

**CODE: 16BS1003**

**SET-2**

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

**I B.Tech II Semester Regular & Supplementary Examinations, June-2018**

## **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 Prove that the diameter of the  $n^{\text{th}}$  dark ring in a Newton's ring set-up is directly proportional to the square root of the ring number. 8 M
- b Explain the principle of superposition. 2 M
- c White light is incident normally on a soapy water film of thickness  $4 \times 10^{-5}$  cm and  $\mu$  is 1.33. Which wavelength is reflected strongly in  $0^{\text{th}}$  order of the resulting interference pattern? 4M

**(OR)**

2. a Explain Fraunhofer diffraction at a single slit and Prove that the intensity of the secondary maxima formed for Fraunhofer diffraction at a single slit is of decreasing order. 10M
- b List at least four differences between Interference and Diffraction. 4M

### **UNIT-II**

3. a What are the laser characteristics? Describe the principle and working of He-Ne LASER. Why a narrow discharge tube is used in He-Ne LASER? 10M
  - b Explain the basic principles of LASERS. 4 M
- (OR)**
4. a Distinguish between single mode and multimode fibres with suitable diagrams. 8M
  - b Explain with necessary theory, the propagation of light in optical fibres. Derive an expression for Numerical aperture. 6M

### UNIT-III

5. a Explain de-Broglie's hypothesis. Derive an expression for the de-Broglie's wavelength of an electron accelerated through a potential  $V$ . 10M
- b An electron is confined to a one dimensional infinite potential of width 1 nm. Calculate the wavelength of the radiation emitted when it undergoes a transition from  $n=6$  state to the  $n=2$  state. 4 M

(OR)

6. a With suitable diagram of one dimensional potential well and imposing boundary conditions, derive Schrodinger wave equation for an electron and explain the variation of energy levels. 10M
- b An electron is confined between two impenetrable walls 0.2 nm apart, Determine the energy levels for the states  $n=1,2$ . 4M

### UNIT-IV

7. a Distinguish between diamagnetic, paramagnetic and ferromagnetic materials? 10M
- b A magnetic material has magnetization of 2300 A/m and produces a flux density of 0.00314 Wb/m<sup>2</sup>. Calculate the Magnetizing Force. 4M

(OR)

8. a What is ferromagnetic hysteresis? Explain the changes in the domain structure that occur during hysteresis. 10M
- b Discuss the applications of Soft ferrites. 4 M

### UNIT-V

9. a Explain Electronic polarization and derive an expression for electronic polarization in terms of radius of the atom 10M
- b Explain the terms polarization and polarizability. 4M

(OR)

10. a How does the dielectric constant of a ferroelectric vary with temperature? Mention some uses of ferroelectric materials. 6M
- b Explain ionic polarizability. 4M
- c Explain the terms dielectric constant and dielectric loss. 4M

# AR16

**CODE: 16BS1004**

**SET-I**

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

**I B.Tech II Semester Regular & Supplementary Examinations, June-2018**

**ENGINEERING CHEMISTRY  
(Common to ECE, CSE & IT)**

**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 Compare the compression, injection, transfer and extrusion moulding techniques with each other to their merits and demerits 5M
- b Define polymer and mention any two natural polymers 2M
- c Define setting and hardening of cement. Explain in which way including chemical reactions, how the strength of the cement is developed in construction 7M

**(OR)**

2. a What is compounding and advantages of it in plastics? 2M
- b Explain in detail the suitable moulding technique procedure for Thermoplastic polymer 5M
- c Explain the process of manufacturing of cement by wet process 7M

## UNIT-II

3. a Water sample has the following compositions per litre: Mg  $(\text{HCO}_3)_2$  = 14.6 mg,  $\text{MgCl}_2$  = 19 mg,  $\text{Ca}(\text{HCO}_3)_2$  = 16.2mg,  $\text{CaSO}_4$  = 10mg,  $\text{HCO}_3^-$  = 6.1 mg,  $\text{Ca}(\text{NO}_3)_2$  = 0.11 mg,  $\text{CO}_2$  = 4.4 mg,  $\text{OH}^-$  = 1.7 mg,  $\text{HCl}$  = 3.65 mg,  $\text{KCl}$  = 7.45 mg and silicates = 1.42mg. Find out Carbonate and Non carbonate hardness's in Calcium Carbonate equivalent? 7M
- b Define hardness. What is the working principle involved in the hardness estimation by EDTA method. Explain the procedure for estimation of total hardness. 7M

**(OR)**

4. a Explain about R.O (Reverse osmosis) Method and write it's advantages and disadvantages. 8M
- b Write in detail about break point chlorination with graphical representation. 6M

### **UNIT-III**

5. a Explain about wet corrosion in acidic medium (Evolution of hydrogen type). 4M  
b Write about stress corrosion. 4M  
c Explain in which way the rate of corrosion is influenced by following factors (i) Nature of the oxide film (ii) Temperature (iii) Humidity 6M

**(OR)**

6. a Suggest and explain a suitable corrosion mechanism takes place in an Iron gate, when it is located at immediate beach 7M  
b Explain the process in which way the buried Iron pipe protect against corrosion 7M

### **UNIT-IV**

7. a Define knocking and anti-knocking. Explain in detail about role of octane number of petrol in IC Engine 7M  
b Define lubricant. Suggest and explain a suitable lubrication mechanism, if the machine surfaces moving under low load with high speed. 7M

**(OR)**

8. a Explain the procedure in detail about getting of gasoline from water gas 7M  
b Write short notes on (i) Flash and fire point (2M) (ii) Viscosity (2M) (iii) Mechanical strength of lubricant (3M) 7M

### **UNIT-V**

9. a Explain about solar thermal power systems and how the power is generated through parabolic trough system 8M  
b Write short notes on (i) Calomel electrode (3M) (ii) harnessing of solar energy (3M) 6M

**(OR)**

10. a Derive Nernst equation. What are the applications of Nernst equation? 8M  
b How the power is generated through solar tower system. What are the advantages and disadvantages of solar energy? 6M

# AR13

CODE: 13BS1004 **SET-2**  
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, June-2018

**ENGINEERING PHYSICS**

(Common to EEE & ECE)

Time: 3 Hours

Max Marks: 70

## PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

- 1.a) Why the centre spot is dark in Newton's rings formed by reflected light?
- b) What is the condition to produce a sustained diffraction?
- c) Mention the important components of Laser device.
- d) What is the importance of optical resonator in laser components?
- e) Write the lattice parameters of triclinic structure
- f) Draw the following planes in the unit cell: (121), [101]
- g) What are domains in ferromagnetism?
- h) What is Piezoelectricity?
- i) Define mobility of charge carriers
- j) What is the velocity of matter waves?

## PART-B

Answer one question from each unit

[5x12=60M]

### UNIT-I

- 2.a) Explain the principle of superposition of waves
- b) Explain Young's double slit experiment and draw intensity distribution graph [4M+8M]

(OR)

- 3.a) Write the differences between fresnel and fraunhofer diffraction techniques
- b) Explain the interference in plane parallel thin film by reflection [4M+8M]

### UNIT-II

- 4.a) Explain the characteristics of laser light
- b) With neat diagram explain the construction and working of Ruby laser [4M+8M]

**(OR)**

- 5.a) Derive the expressions of acceptance angle and numerical aperture of optical fiber
- b) Calculate numerical aperture and acceptance angle for an optical fiber having core of refractive index 1.55 and cladding of refractive index 1.50 respectively. [8M+4M]

**UNIT-III**

6. a) Explain terms i) Atomic radius ii) Atomic packing factor of a crystal
- b) Find the above values for SC, BCC and FCC structures [4M+8M]

**(OR)**

7. What are Miller indices? Derive an expression for the inter planar distance between two adjacent planes of miller indices (hkl) in a cubic lattice. [12M]

**UNIT-IV**

8. a) Derive the relation between B, H & I in magnetism
- b) Explain the origin of magnetic moment at the atomic level [4M+8M]

**(OR)**

- 9.a) Explain electronic polarization in dielectrics
- b) An elemental dielectric has a relative dielectric constant of 12. It also contains  $5 \times 10^{28}$  atoms/m<sup>3</sup>. Calculate its electronic polarizability assuming Lorentz field [8M+4M]

**UNIT-V**

- 10.a) Define terms i) Drift velocity, (ii) Mean free path and (iii) mobility
- b) Derive time independent Schrodinger wave equation [6M+6M]

**(OR)**

- 11.a) Explain de-Broglie hypothesis and find the wavelength of matter waves
- b) With neat diagram explain GP Thomson experiment [6M+6M]

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**I B.Tech II Semester Supplementary Examinations, June-2018**

**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 any four examples of natural polymers?
- b) Explain, how do you remove temporary hardness of water.
- c) Define cathodic protection
- d) Define cetane number
- e) Write any two principles of green chemistry?
- f) Define compounding of plastic and what is the advantage?
- g) Write the formula of Zeolite bed
- h) Define pilling Bedworth rule.
- i) Define knocking and give an example of better anti-knocking agent
- j) Write the structure and full form of EDTA.

## **PART-B**

**Answer one question from each unit**

**[5x12=60M]**

### **UNIT-I**

2. a) Write the preparation, properties and engineering applications of Teflon 6M
- b) Explain in detail the moulding process adopted for making of pens (made of LDPE)? 6M

**(OR)**

3. a) Explain the procedure for manufacture of Portland cement by wet process. 6M
- b) Explain the role of following compounding agents(with examples) in the compounding of plastics 6M  
(i) Fillers (ii) Plasticizers (iii) stabilizers (iv) accelerators

## UNIT-II

4. a Explain the procedure for making of softening water by zeolite method. What are the limitations in this process? 6M
- b A water sample containing the following constituents per mg/L.  $\text{NaHCO}_3 = 6.1$ ,  $\text{Mg}(\text{HCO}_3)_2 = 21.9$ ,  $\text{Ca}(\text{HCO}_3)_2 = 24.3$ ,  $\text{MgCl}_2 = 9.5$ ,  $\text{CaSO}_4 = 20.4$ ,  $\text{K}_2\text{SO}_4 = 11.2$ ,  $\text{FeCl}_2 = 1.27$  and  $\text{KCl} = 3.85$ . Find out temporary, permanent and total hardness in the given water sample in degree French 6M
- (OR)**
5. a i) Define hardness. Write only the working principle and reactions involved in the hardness estimation by EDTA method. 3+3M
- ii) Write about break point chlorination
- b i) Which salts are responsible for temporary and permanent hardness in water? 2+4M
- ii) A water sample containing the following constituents are in ppm  $\text{Ca}(\text{HCO}_3)_2 = 16.2$ ,  $\text{MgSO}_4 = 12.0$ ,  $\text{CaCl}_2 = 11.1$ ,  $\text{Ca}(\text{NO}_3)_2 = 8.2$ ,  $\text{NaCl} = 3.85$ , Find out carbonate, non-carbonate and total hardness in the given water sample in degree Clark

## UNIT-III

6. a Define wet corrosion. Explain a suitable corrosion mechanism when an Iron rod is exposed to acidic environment 6M
- b Explain the following factors towards influence the rate of corrosion on metals? 6M
- (i) Solubility of corrosion products (ii) Temperature (iii) Humidity
- (OR)**
7. a Suggest and explain a suitable method against corrosion in the case of a metallic pipeline is buried in the soil 6M
- b If half of the iron rod is continuously exposed to water, in this case suggest which type of corrosion is leading and write the suitable corrosion mechanism 6M



#### **UNIT-IV**

8. a Explain the process, in which way commercial by products are obtained from crude oil and list out the byproducts with Boiling range, Carbon content and their uses 6M
- b Define flash and fire point, cloud and pour point & aniline point. What is the importance's of these in lubricants? 6M
- (OR)**
9. a Define lubricant and lubrication. If a machine is working under high pressure & temperature, suggest and explain suitable mechanism involved in this type of machinery? 6M
- b Explain about the process of synthetic petrol by Fischer-Tropschs method. 6M

#### **UNIT-V**

10. a Write the properties of nanomaterials based on size of the particles 6M
- b Write in detail any one of the green synthesis method 6M
- (OR)**
11. a Explain any six engineering applications of nano materials 6M
- b Explain the process about conversion of solar energy into electrical energy 6M