AR18

UNIT-I

1. a) Derive an expression for fringe width for a Young's double-slit experiment   8M
   b) Distinguish between interference and diffraction.   4M

(OR)

2. a) Explain Fraunhofer diffraction at a single slit   10M
   b) Explain why Newton's rings are circular in shape?   2M

UNIT-II

3. a) What is numerical aperture of an optical fiber? Derive the expression for it.   8M
   b) Estimate the critical angle when the core refractive index is 1.48 and the relative refractive index is 2%.   4M

(OR)

4. a) Explain Fiber optic communication system with a neat diagram.   8M
   b) Write the applications of optical fibers.   4M

UNIT-III

5. a) Write a short note on wave particle duality.   4M
   b) Derive Schrodinger's time-independent wave equation.   8M

(OR)

6. a) An electron is accelerated to a potential difference of 100V. Find its wavelength.   4M
   b) What is de-Broglie's hypothesis? Derive the expressions for wavelength.   8M

UNIT-IV

7. a) Derive the expression for electric field due to a point charge.   8M
   b) State and explain Lenz's law.   4M

(OR)

8. a) Write Maxwell's equations in integral and differential forms.   8M
   b) What are the differences between Ampere's law and Biot-Savart law?   4M

UNIT-V

9. a) What is drift current? Derive the expression for drift current density.   8M
   b) Distinguish between intrinsic and extrinsic semiconductors.   4M

(OR)

10. a) Derive the continuity equation of electrons.   8M
    b) Explain the variation of Fermi level with temperature.   4M

***

AR18

CODE: 18BST107   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, February-2020

ENGINEERING PHYSICS
(Common to CE & ME 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) Deduce the conditions for under damped, over damped and critical damped motion of the oscillator.   8M
   b) The amplitude of a damped harmonic oscillator reduces from 20 to 2 cm after 100 oscillations, each of period 2.3 sec. Calculate the logarithmic decrement of the system ($\log_e 10 = 2.30$).   4M

(OR)

2. a) Explain the terms damped, under damped and over damped oscillations.   8M
   b) Distinguish between longitudinal and transverse waves.   4M

UNIT-II

3. a) Derive an expression for fringe width for a Young's double slit experiment   8M
   b) In Young's experiment, let light of wavelengths 5×10^{-7}m and 8×10^{-8}m be used in turn, keeping the geometry same. Compare the fringe width in two cases.   4M

(OR)

4. a) Explain Fraunhofer diffraction at a double slit   8M
   b) Distinguish between interference and diffraction.   4M

UNIT-III

5. a) Define the terms population inversion and optical resonator.   4M
   b) Describe the construction and working of He-Ne laser.   8M

(OR)

6. a) Describe the construction and working of Nd-YAG laser.   8M
   b) Briefly explain the characteristics of a laser.   4M

UNIT-IV

7. a) Explain the propagation of light through an optical fibre.   6M
   b) Write the applications of optical fibres.   6M

(OR)

8. a) Write a short note on types of optical fibres.   8M
   b) The refractive indices of core and cladding are 1.42 and 1.40 respectively. Calculate its numerical aperture.   4M

UNIT-V

9. a) What is Hysteris? Explain hysteresis curve with neat diagram.   8M
   b) Write the applications of Superconductors.   4M

(OR)

10. a) Distinguish between Type-I and Type-II superconductors.   8M
    b) Write a note on Weiss theory of ferromagnetism.   4M

AR18

CODE: 18BST108   SET-2
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, February-2020
CHEMISTRY
(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) With the help of VSEPR theory, explain shapes and hybridizations of the molecules i) H_2O ii) NH_3 8M
   b) Write a note on i) atomic sizes   ii) ionization energies   4M
   (OR)
2. a) Explain the salient features of molecular orbital theory.   6M
   b) Explain molecular orbital diagram of CO.   6M

UNIT-II

3. a) Discuss with suitable examples the electronic transitions occurring in UV-visible region.   8M
   b) Write a note on chemical shift.   4M
   (OR)
4. a) Explain principle of IR spectroscopy. Write the significance of fingerprint region. 6M
   b) Write a note on the following i) coupling constant   ii) phosphorescence 6M

UNIT-III

5. a) What is electrochemical series? Explain its significance.   6M
   b) Explain construction and working of Calomel electrode.   6M
   (OR)
6. a) Explain any three factors influencing rate of corrosion.   6M
   b) What is cathodic protection? How do you protect metallic structures like shiphulls from corrosion using sacrificial anode method?   6M

UNIT-IV

7. a) Explain the mechanisms of E_1 and E_2 reactions.   8M
   b) Explain classification of polymers with suitable examples.   4M
   (OR)
8. a) Explain mechanism of polymerization by using Ziegler-Natta catalyst.   6M
   b) Write a note on the following i) Cis-trans isomerism   ii) Claisen rearrangement 6M

UNIT-V

9. a) Differentiate between renewable and non-renewable energy sources.   6M
   b) Define green chemistry. Explain any six principles of green chemistry. 6M
   (OR)
10. a) Explain construction and working of lead-acid battery.   6M
    b) Write the differences between batteries and supercapacitors.   6M

***

AR16

CODE: 16BS1003   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech I Semester Supplementary Examinations, February-2020

ENGINEERING PHYSICS

(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)	Draw the diagram for superposition of waves and resultant wave	2
	b)	Explain the working of anti reflective coatings with diagram	4
	c)	Derive an expression for determination of wavelength of given monochromatic light using Newton's rings experiment	8

(OR)

2.	a)	Define diffraction.	2
	b)	Derive an expression for central maxima, minima and secondary maxima for Fraunhofer's diffraction through single slit	12

UNIT-II

3.	a)	Define stimulated emission	2
	b)	Mention any four characteristics of laser	4
	c)	Explain the construction and working of Helium Neon laser with energy level diagram	8

(OR)

4.	a)	Draw the diagram indicating various layers of optical fiber	2
	b)	Spontaneous emission produces laser. State True or False and Justify.	4
	c)	Mention any four differences between step indexed and graded index optical fiber with diagram	8

UNIT-III

5.	a)	Define de Broglie's matter wave	2
	b)	State any four differences between Maxwell Boltzmann statistics and Fermi Dirac statistics	4
	c)	State Heisenber's uncertainty principle. Using this prove the Non existence of electrons in nucleus. (Take size of the nucleus = 10^{-14} m)	8

(OR)

6.	a)	Define wavefunction	2
	b)	Mention any four characteristics of wavefunction	4
	c)	Derive the Schrodinger's time independent wave equation	8

UNIT-IV

7.	a)	Define magnetostriction	2
	b)	Derive the relation between B, H and I	4
	c)	State and explain any four differences between soft and hard magnetic materials with hysteresis curves	8

(OR)

8.	a)	Define magnetic flux	2
	b)	Derive an expression for Bohr magneton	4
	c)	Explain Domain theory of ferromagnetism with diagrams	8

UNIT-V

9.	a)	State the difference between dielectric material and insulating material	2
	b)	Derive the relation between D, E and P	4
	c)	Explain electronic and orientation polarization with diagrams	8

(OR)

10.	a)	Define piezoelectricity	2
	b)	Draw the crystal structure of BaTio3 and how do you achieve polarization in BaTio3?	4
	c)	Explain the frequency dependence of polarization with suitable diagram	8

***

AR16

CODE: 16BS1004   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, February-2020
ENGINEERING CHEMISTRY
(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 addition polymerization? Explain its mechanism.   7
   b) Write any 5 compounding of plastic and its importance.   7
   (OR)
2. a) Write a detailed note on setting of Portland cement with its chemistry.   7
   b) Explain the manufacturing of Portland cement by wet process.   7

UNIT-II

3. a) 0.5g of $CaCo_3$ was dissolved in dilute HCL and diluted to 500 ml with distilled water,50 ml of this solution required 48 ml of EDTA solution for titration.50ml of hard water sample required 15 ml of EDTA solution for titration.50 ml of same water sample on boiling and filtering requires 10 ml of EDTA solution . Calculate temporary, permanent and total hardness in ppm.   6
   b) Write a short note on   4+4
      i) What are the units of Hardness of water and also write its conversions?
      ii) Sedimentation with coagulation
   (OR)
4. a) Write the determination of Hardness of water by EDTA method.   7
   b) Explain Ion – Exchange process with neat diagram.   7

UNIT-III

5. a) Define corrosion. Explain the Mechanism of Electro chemical corrosion.   6
   b) Explain the principle and process of sacrificial anode protection and impressed current cathode protection methods with neat sketch.   8
   (OR)
6. a) Describe any 4 method of control of corrosion under proper design.   7
   b) Write a brief note on   4+3
      i) Use of Inhibitors   ii) Galvanization

UNIT-IV

7. a) Explain fractional distillation of refining of petroleum.   7
   b) Explain with neat diagram, how the synthetic petrol is manufactured by Fischer – Tropsch method.   7
   (OR)
8. a) What is fire and flash point and Explain about Pensky Martens closed cup apparatus?   7
   b) Explain the Extreme pressure lubrication mechanism.   7

UNIT-V

9. a) Derive Nernst's equation for single electrode potential.   7
   b) How the potential of electrode is measured with SHE?   7
   (OR)
10. a) What are the major gases responsible for GHE, global scenario of green house gases? Write the mechanism of Glass House Effect.   6
    b) Write any 2 solar energy harnessing methods   4+4

AR16

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)	Draw the diagram for superposition of waves and resultant wave	2
	b)	Explain the working of anti reflective coatings with diagram	4
	c)	Derive an expression for determination of wavelength of given monochromatic light using Newton's rings experiment	8

(OR)

2.	a)	Define diffraction.	2
	b)	Derive an expression for central maxima, minima and secondary maxima for Fraunhofer's diffraction through single slit	12

UNIT-II

3.	a)	Define stimulated emission	2
	b)	Mention any four characteristics of laser	4
	c)	Explain the construction and working of Helium Neon laser with energy level diagram	8

(OR)

4.	a)	Draw the diagram indicating various layers of optical fiber	2
	b)	Spontaneous emission produces laser. State True or False and Justify.	4
	c)	Mention any four differences between step indexed and graded index optical fiber with diagram	8

UNIT-III

5.	a)	Define de Broglie's matter wave	2
	b)	State any four differences between Maxwell Boltzmann statistics and Fermi Dirac statistics	4
	c)	State Heisenber's uncertainty principle. Using this prove the Non existence of electrons in nucleus. (Take size of the nucleus = 10^{-14} m)	8

(OR)

6.	a)	Define wavefunction	2
	b)	Mention any four characteristics of wavefunction	4
	c)	Derive the Schrodinger's time independent wave equation	8

UNIT-IV

7.	a)	Define magnetostriction	2
	b)	Derive the relation between B, H and I	4
	c)	State and explain any four differences between soft and hard magnetic materials with hysteresis curves	8

(OR)

8.	a)	Define magnetic flux	2
	b)	Derive an expression for Bohr magneton	4
	c)	Explain Domain theory of ferromagnetism with diagrams	8

UNIT-V

9.	a)	State the difference between dielectric material and insulating material	2
	b)	Derive the relation between D, E and P	4
	c)	Explain electronic and orientation polarization with diagrams	8

(OR)

10.	a)	Define piezoelectricity	2
	b)	Draw the crystal structure of BaTio3 and how do you achieve polarization in BaTio3?	4
	c)	Explain the frequency dependence of polarization with suitable diagram	8

***

AR13

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, February-2020

ENGINEERING PHYSICS
(Common to CIVIL, MECH, CSE, IT)

Time: 3 Hours   **Max Marks: 70**

PART-A
ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) Define Coherence
    b) Define Fresnel diffraction
    c) State the reason behind directionality of laser light
    d) Mention any one advantage of optical fiber over conventional copper cable in communications
    e) Define Coordination number
    f) Define Unit cell
    g) Define magnetic susceptibility
    h) Define dielectric polarization
    i) Define mean free path
    j) Define wave function

PART-B
Answer one question from each unit   **[5x12=60M]**

UNIT-I

2. a) Using the principle of superposition of waves, derive an expression for amplitude of resultant wave   8
    b) Mention any four differences between Interference and diffraction   4

(OR)

3. a) Derive expressions for Intensity of central maxima, secondary maxima and minima formed due to diffraction at single slit   12

UNIT-II

4. a) Explain the construction and working of Ruby laser with energy level diagram   8
    b) Mention any four applications of lasers   4

(OR)

5. a) Explain the differences between step index and graded index optical fibers with diagrams   8
    b) Draw and label the different regions of optical fiber   4

UNIT-III

6. a) Draw and label the 7 crystal systems with their geometries   8
    b) State and explain Bragg's law of crystal diffraction with diagram   4

(OR)

7. a) Derive an expression for distance of separation between successive (hkl) planes   8
    b) Calculate the atomic packing factor of body centered cubic crystal structure   4

UNIT-IV

8. a) Explain domain theory of ferromagnetism with diagrams.   8
   b) Explain electronic polarization of dielectric materials with diagram   4

(OR)

9. a) Compare diamagnetic and paramagnetic materials with examples   8
   b) Derive the relation between relative permeability and susceptibility   4

UNIT-V

10. a) Explain GP Thomson experiment with diagram   8
    b) Explain the physical significance of wave function (any four)   4

(OR)

11. a) Derive the Schrodinger's time independent wave equation   8
    b) Mention the postulates of classical free electron theory (any four)   4

***

AR13

PART-A

ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) Give an example for each addition and condensation polymers.
    b) Name the different raw materials used in the manufacturing of OPC.
    c) Write any two disadvantages of hard water.
    d) What is disinfectioning?
    e) Write any two factors that affect the rate of corrosion.
    f) Explain the term passivity.
    g) Name the different types of mechanism of lubrication.
    h) Define octane number.
    i) Write any two applications of CNT's.
    j) Give any two principles of green chemistry.

PART-B

Answer one question from each unit   **[5x12=60M]**

UNIT-I

2. a) Discuss in detail about the preparation, properties and applications of PVC and PE.   8M
    b) Write any four differences between thermoplastic and thermosetting polymers.   4M
    (OR)
3. a) Explain in detail about the manufacturing of cement.   7M
    b) Give a detailed account on setting and hardening of cement.   5M

UNIT-II

4. a) Explain in detail about desalination of brackish water.   8M
    b) Briefly explain sterilization and chlorination   4M
    (OR)
5. a) Explain how to determine the hardness water by EDTA method.   6M
    b) What is hardness of the water? Explain different types of hardness and write units   6M
        of hardness of water.

UNIT-III

6. a) With suitable examples, explain the mechanism of electrochemical corrosion.   8M
    b) Discuss how corrosion is controlled by proper design of machinery.   4M
    (OR)
7. a) Explain cathodic protection methods to control corrosion.   8M
    b) Briefly explain galvanic corrosion and concentration cell corrosion.   4M

UNIT-IV

8.	a)	Give a detailed account on Bergius process of synthesis of petrol.	6M
	b)	Write a detailed account on fixed bed catalytic cracking	6M

(OR)

9.	a)	Discuss the mechanism of hydrodynamic and extreme pressure lubrication	8M
	b)	Explain cloud point and pour point.	4M

UNIT-V

10.	a)	Explain the construction and working of photovoltaic cell	6M
	b)	Explain how fullerenes are synthesized?	6M

(OR)

11.	a)	Give the engineering and bio medical applications of Nano particles.	8M
	b)	Discuss any one method of synthesis of nano materials.	4M