CODE: 20BST105   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Regular/Supplementary Examinations, April, 2022
APPLIED PHYSICS
(Common to 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 in one place

UNIT-I

1. a) How Newtons rings are formed and why they are circular. 3M
   b) Obtain the wavelength of monochromatic light by using the newtons ring experiment method? 7M

(OR)

2. a) Give the difference between interference and diffraction. 3M
   b) Explain about Fraunhofer diffraction due to a single slit. 7M

UNIT-II

3. a) Briefly explain the characteristics of lasers. 3M
   b) Explain the construction and working procedure of ruby LASER. 7M

(OR)

4. a) Give the applications of LASER in the medical field. 3M
   b) Derive Einsteans coefficients by following qualitative treatment. 7M

UNIT-III

5. a) Identify the construction of optical fibre 3M
   b) Differences between Step Index Fibers and Graded Index Fibers 7M

(OR)

6. a) Recognize the principle of optical fibre 3M
   b) Summarize the applications of Optical Fibers in Communication. 7M

UNIT-IV

7. a) Explain the concept of de-Broglie hypothesis 3M
   b) Produce the energy equation for a particle in a one dimensional Potential Box by applying Schrodinger time-independent wave equation. 7M

(OR)

8. a) Recall the Heisenberg's Uncertainty Principle 3M
   b) Discuss the physical significance of the wave function. 7M

UNIT-V

9. a) State Guass law of electro statics. 3M
   b) Discuss any one of the applications of Gauss Law. 7M

(OR)

10. a) State the Biot- Savart Law 3M
    b) Write Maxwell's Equations and their Applications 7M

UNIT-VI

11. a) Compare the drift and diffusion currents in semiconductors? 3M
    b) Derive the expression for the conductivity of semiconductors 7M

(OR)

12. a) Demonstrate the hall effect with the help of the figure. 5M
    b) Derive the mobility of charge carriers in the Hall effect. 5M

AR20

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 damped oscillation? Derive equation of motion for damped Oscillation. Discuss condition for over damped motion. 8M
   b) The amplitude of an oscillator of frequency 200 per second falls to 1/10 of its initial value after 2000 cycles. Calculate its relaxation time. 2M

(OR)

2. a) What is simple harmonic motion? Derive a relation for displacement, time period, and acceleration of a particle executing simple harmonic motion. 8M
   b) A body executing SHM has its velocity 16cm/sc when passing through its mean position. If it goes 1cm either side of mean position, calculate its time period. 2M

UNIT-II

3. a) Describe Fraunhofer diffraction due to a single slit and deduce the position of the maxima and minima. **8M**
   b) Distinguish between Interference and Diffraction . **2M**

(OR)

4. a) In Newton's ring experiment show that the diameter of the dark ring directly proportional to the square root of the natural number. **8M**
   b) In a Newton's ring experiment the diameter of 9th dark ring is 0.38cm when a light of wavelength 5469^0A used normally. Find the diameter of 18th dark ring. **2M**

UNIT-III

5. a) With a neat diagram discuss construction, working and uses of He-Ne Laser. 8M
   b) Calculate the wavelength of emission from GaAs semiconductor laser whose band gap energy is 1.44 ev (Plank's constant is 6.625×10^{-34} Js and charge of an electron is 1.6×10^{-19} C.) 2M

(OR)

6. a) Define (i) Spontaneous emission (ii)Stimulated emission (iii)Pumping (iv) Population inversion **8M**

b) The wavelength of a semiconductor laser is 1.55µm. Calculate its band gap in eV. **2M**

UNIT-IV

7. a) Describe graded index optical fibre and explain the transmission of signal through it. 8M

b) Calculate the fractional index change for a given optical fibre if the refractive indices of core and cladding are 1.563 and 1.498 respectively. 2M

(OR)

8. a) With a neat diagram discuss principle and construction of optical fibre. **8M**

b) An optical fibre has a core material of refractive index of 1.55 and cladding material of refractive index of 1.50. The light is lunched into in air. Calculate its numerical aperture **2M**

UNIT-V

9. a) Show that the FCC is the most closely packed of the three cubic structures by working out the packing factors. 8M

b) Determine lattice constant for FCC lead crystal of radius 1.746 Å. 2M

(OR)

10. a) Discuss the seven crystal system with diagram. 7M

b) Iron crystallizes in BCC structure. Calculate the lattice constant, given that the atomic weight and densities of iron are 55.85 and 7860 kg / m^3 respectively. 3M

UNIT-VI

11. a) How materials are classified as dia or para or ferromagnetic? Explain. 8M

b) A paramagnetic material has a magnetic field intensity of 10^4 A/M. If the susceptibility of the material at room temperature is 3.7 x 10^{-3}, calculate the magnetization and flux density in the material. 2M

(OR)

12. a) Define Meissner effect. Show that superconductors are perfectly diamagnetic substance. 6M

b) Discuss any two applications of superconductor 4M

AR20

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Regular/Supplementary Examinations, April, 2022
CHEMISTRY
(Common to MECH, CSE, AI&ML, IT)

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) | State any four Disadvantages of Hardness of water | 4M |
| | b) | What is permutit? Describe with neat sketch and chemical reactions the process of softening of water by Zeolite process | 6M |

(OR)

| 2. | a) | Explain how Chlorination is disinfecting the water | 4M |
| | b) | Discuss the methods Sedimentation, Coagulation and filtration how they can remove Colloidal and suspended impurities? | 6M |

UNIT-II

| 3. | a) | Illustrate different types of electronic transitions | 5M |
| | b) | Illustrate different types of absorption and intensity shifts in UV-Visible spectroscopy | 5M |

(OR)

| 4. | a) | Discuss on bending and stretching vibrations with neat sketch | 5M |
| | b) | Explain the role of coupling constant in NMR spectroscopy | 5M |

UNIT-III

| 5. | a) | Differentiate Addition polymers from Condensation polymers | 4M |
| | b) | Discuss on Compounding of plastics | 6M |

(OR)

| 6. | a) | Describe How thermosetting articles can be moulded | 4M |
| | b) | Expand PVC? Explain the preparation and engineering applications of PVC | 6M |

UNIT-IV

| 7. | a) | How peroxide will influence the HBr addition on Unsymmetrical Alkenes? Explain. | 5M |
| | b) | Discuss Nucleophilic Substitution of Bimolecular reactions with mechanism | 5M |

(OR)

| 8. | a) | Discuss about E^1 and E^2 reactions with mechanism | 5M |
| | b) | Explain the Pinacol Pinacolone rearrangement with mechanism | 5M |

UNIT-V

| 9. | a) | What is wet corrosion? Explain the theory of Electrochemical corrosion | 10M |

(OR)

| 10. | a) | Discuss How Nature of Metal effecting Corrosion | 6M |
| | b) | Justify Galvanization is a Sacrificial Anodic protection | 4M |

UNIT-VI

| 11. | a) | Discuss the Alternative energy resources available in present to reduce the load on Conventional energy sources in detail | 10M |

(OR)

| 12. | a) | Explain how photo voltaic cell works and give its uses | 6M |
| | b) | Construct a Alkaline battery and explain the working with chemical reactions | 4M |

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CODE: 18BST107   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, April-2022
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) What are Damped oscillations? Derive and solve differential equation of damped harmonic oscillator?   8 M
   b) What are the characteristics of Simple Harmonic Oscillator?   4 M

(OR)

2. a) What are forced oscillations? Obtain an expression for the amplitude of forced oscillator and give the condition for amplitude resonance.   8 M
   b) Explain resonance and quality factor.   4 M

UNIT-II

3. a) Describe and explain the phenomenon of interference of light by young's double slit experiment.   8 M
   b) Explain the principle of superposition of waves.   4 M

(OR)

4. a) Discuss the Fraunhofer diffraction at a single slit. Obtain the condition for principal maximum and minimum   8 M
   b) How is diffraction different from interference?   4 M

UNIT-III

5. a) How will you differentiate laser light with ordinary light?   4 M
   b) Describe the construction and working of Nd:YAG laser.   8 M

(OR)

6. a) Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein coefficients.   8 M
   b) What are the necessary conditions for lasing action?   4 M

UNIT-IV

7. a) Write the advantages of optical fibers .   4 M
   b) Draw the block diagram of fiber optics communication system and explain the function of each block   8 M

(OR)

8. a) Calculate the numerical Aperture and Acceptance angle for an optical fiber with core and cladding refractive indices being 1.48 and 1.45 respectively.   4 M
   b) Derive an expression for the numerical aperture and the fractional index change of an optical fiber.   8 M

UNIT-V

9. a) Explain the phenomenon of superconductivity and write the properties of superconductors   6 M
   b) Explain the critical parameters and their significance in superconductors.   6 M

(OR)

10. a) What is Meissner effect? Explain.   4 M
    b) How are superconductors classified? Mention some of the applications of superconductors.   8 M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, April-2022
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)	List out the postulates of molecular orbital theory.	8M
	b)	Outline the sp^2 hybridization with an example	4M
		(OR)	
2.	a)	Postulate the VSEPR theory along with its limitations.	8M
	b)	Draw the MO energy level diagram for CO molecule	4M

UNIT-II

3.	a)	Outline the principle of NMR Spectroscopy.	8M
	b)	Define the following with an example a) Chromophore b) Auxochrome	4M
		(OR)	
4.	a)	Outline the principle of IR Spectroscopy.	8M
	b)	Define a) Finger print region b) Chemical splitting	4M

UNIT-III

5.	a)	Discuss the factors that affect the rate of corrosion.	8M
	b)	What is electrochemical series? Give its importance	4M
		(OR)	
6.	a)	Explain the construction and working of a) Standard hydrogen electrode b) Calomel electrode.	8M
	b)	What is corrosion? How does the proper design can control the corrosion	4M

UNIT-IV

7.	a)	What is Diels – Alders reaction? Describe the mechanism of Diels – Alders reaction with an example.	8M
	b)	Explain Cis – Trans isomerism with an example.	4M
		(OR)	
8.	a)	Explain the mechanism of SN^1 reaction with an example.	8M
	b)	Write the differences between addition polymerization and condensation polymerization	4M

UNIT-V

9.	a)	Illustrate the working of a PV cell. Write its disadvantages	8M
	b)	Define a) Battery b) Super capacitor	4M
		(OR)	
10.	a)	Explain the working of lead acid battery with a neat labelled diagram.	8M
	b)	List out any four principles of green chemistry	4M

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CODE: 16BS1003   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, April, 2022
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)	Explain the principle of superposition of waves.	4M
	b)	What are the conditions to obtain the maximum and minimum intensities in the reflected light due to a thin film.	10 M

(OR)

2.	a)	Describe the Fraunhofer diffraction pattern obtained with single slit.	10M
	b)	A single slit in Farunhofer diffraction is illuminated by white light. The first minimum for red light wavelength 6500 Å falls at an angle 30˚. Find the slit width.	4M

UNIT-II

3.	a)	Explain different characteristics of Lasers essential for lasing action.	4M
	b)	With the neat sketch of energy level diagrams explain the principle, construction and working of a Helium-Neon Laser.	10M

(OR)

4.	a)	What is an Optical Fiber? Elaborate the concepts of Single Mode Fibers and Multimode Fibers.	10 M
	b)	Describe various applications of optical fibers in communication system.	4M

UNIT-III

5.	a)	Explain in detail the concepts of Wave Particle Duality and De-Broglie Hypothesis	8M
	b)	Using the concept of Heisenberg's Uncertainty Principle, explain the existence of Protons and Neutrons in Nucleus and radiation of Light from an excited atom.	6M

(OR)

6.	a)	Derive Time independent Schrödinger wave equation.	8M
	b)	What do you understand by the concepts of Fermi Dirac and Bose Einstein Statistics for the moment of an electron.	6M

UNIT-IV

7.	a)	Deduce the relation between B, H & I for a magnetic material placed in a magnetic field.	6M
	b)	Derive an expression for the Bohr magnetron from the concept of Origin of magnetic moment.	8 M

(OR)

8.	a)	Explain the hysteresis loop in ferromagnetic materials.	6M
	b)	What do you understand by the phenomenon Magnetostriction? Mention any four applications of magnetic materials.	8M

UNIT-V

9.	a)	Obtain an expression for Ionic polarization.	6M
	b)	Explain the concepts of Frequency Dependence of Polarizability and Dielectric Loss of a dielectric slab kept in an electric field.	8M

(OR)

10.	a)	Explain the concept of ferroelectricity with an example of formation of Spontaneous Polarization in Barium Titanate.	8M
	b)	Discuss various applications of dielectric materials.	6M

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Time: 3 Hours   Max Marks: 70

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

1. a) Write Cosine law due to interference of light in thin parallel film by reflected light.
   b) What is meant by diffraction of light.
   c) What is the principle of laser.
   d) Define numerical aperture of optical fiber.
   e) What is unit cell.
   f) Write the condition for Bragg's law.
   g) Define magnetic flux density.
   h) What is polarization vector
   i) Define drift velocity of electrons.
   j) Write one dimensional time dependent Schrodinger's wave equation.

PART-B
Answer one question from each unit   [5 X 12M = 60M]
UNIT-I

2. a) Discuss the theory of Newton's rings with relevant diagrams by reflected light and obtain the expressions for the diameters of bright and dark rings.   8M
   b) In Newton's rings experiment, the diameter of the 5th ring is 0.30 cm and diameter of the 15th ring is 0.62cm. Find the diameter of the 25th ring.   4M

(OR)

3. a) Obtain the conditions for principle maxima and minima in Fraunhofer diffraction of light due to a single slit.   8M
   b) Mention any four differences between Fresnel and Fraunhofer diffraction of light.   4M

UNIT-II

4. a) Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein coefficients.   8M
   b) Explain the basic components in laser system.   4M

(OR)

5. a) Derive the expressions for numerical aperture and the fractional change in refractive index of optical fiber.   6M
   b) Explain advantages of Fiber optic communication system.   6M

UNIT-III

6. a) Explain Structure and packing factor of Face centered cubic crystal   8M
   b) Define the following. i) Lattice parameters ii) Coordination number iii) Primitive cell and iv) Non primitive cell.   4M

(OR)

7. a) Derive an expression for inter planar separation between successive $(h\,k\,l)$ 8M
parallel planes for cubic crystal system.

     b) State and explain Bragg's law for X-ray diffraction.   4M

UNIT-IV

8. a) Explain the Domain theory of ferromagnetism.   8M

     b) Define the following. i) Magnetic flux density ii) Magnetic field iii) Intensity of   4M
magnetization and iv) Relative permeability.

(OR)

9. a) What is orientation polarization and derive the expression for its polarizability.   8M

     b) Derive relation between electric susceptibility and dielectric constant .   4M

UNIT-V

10. a) Derive an expression for electrical conductivity of metal based on classical free   8M
electron theory.

     b) Discuss various draw backs of classical free electron theory.   4M

(OR)

11. a) Obtain the expressions for energy and wave function of an electron confined to   8M
move in a one -dimensional potential box.

     b) Calculate the de Broglie wavelength of an electron which has been accelerated   4M
from rest on application of potential of 400 volts.