AR18

CODE: 18BST106 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech I / I B.Tech II Semester Supplementary Examinations, October-2021

APPLIED PHYSICS

(Common to EEE, ECE 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 neat diagrams, discuss the formation of Newton's rings and obtain the expression for the diameter of the dark rings.	(9M)
	b)	Explain how the wavelength of a monochromatic source of light can be determined form Newton's rings method.	(3M)
		(OR)	
2.	a)	Describe in detail the Faunhofer diffraction due to a double slit and draw the intensity distribution curve	(9M)
	b)	Calculate the highest order of diffraction that can be observed with a grating having 15000 lines/inch. The wavelength of light used is 600nm.	(3M)

UNIT-II

3.	a)	Describe the structure of optic fibre. Derive the expression for acceptance angle of the optic fibre in terms of refractive indices of core and cladding.	(9M)
	b)	Calculate the fractional change in the refractive index for a given optic fibre having core and cladding refractive indices 1.563 and 1.498 respectively.	(3M)
		(OR)	
4.	a)	With neat diagrams explain the step index and graded index optic fibres.	(8M)
	b)	Calculate the acceptance angle for an optic fibre with core and cladding refractive index values 1.48 and 1.45 respectively.	(4M)

UNIT-III

5.	a)	What is a matter wave and mention its properties. Derive the expression for wavelength of a matter wave based on de Broglie hypothesis.	(9M)
	b)	Calculate the wavelength of the matter wave associated with an electron accelerated under a potential field of 400V.	(3M)
		(OR)	
6.	a)	Derive the Schrodinger's time independent form of wave equation.	(8M)
	b)	An electron is bound in a one-dimensional infinite well of width 1Å. Find out the energy of the electron in ground state.	(4M)

UNIT-IV

7. a) State and explain the Gauss law in electrostatics (8M)
   b) State the Gauss law in magnetostatics and describe its physical significance. (4M)

(OR)

8. a) State and explain the Maxwell's fourth equation (or) Modified Amperes circuital law and its significance. (10M)
   b) Write the differential forms of Maxwell's 1^{st} and 2^{nd} equations of electromagnetic theory. (2M)

UNIT-V

9. a) With relevant energy band diagrams, classify the direct and indirect band-gap semiconductors and mention few of their applications. (8M)
   b) The intrinsic carrier density at room temperature in Ge is $2.37 \times 10^{19}/m^3$. If the electron and hole mobilities are 0.38 and 0.18 $m^2v^{-1}s^{-1}$ respectively, calculate the resistivity. (4M)

(OR)

10. a) Explain the Hall effect in semiconductors and its significance. (9M)
    b) The Hall coefficient of a semiconductor is $3.22 \text{ X } 10^{-4}$ m^3/C. Calculate the concentration of charge carriers. (3M)

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AR18

CODE: 18BST107 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech I Semester Supplementary Examinations, October- 2021

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)	Explain over damped motion and critical damping in the damped harmonic oscillator from its general solution.	8 M
	b)	Distinguish between damped and forced oscillations?	4 M
		(OR)	
2.	a)	Mention any two physical phenomena where energy resonance occurs.	4 M
	b)	What are forced oscillations? Obtain an expression for the amplitude of forced oscillations.	8 M

UNIT-II

3.	a)	Explain how Newton's rings are formed. Derive an expression for diameters of dark and bright rings	8 M
	b)	What are the necessary conditions for obtaining interference fringes?	4 M
		(OR)	
4.	a)	Explain with necessary theory, the Fraunhofer diffraction due to grating.	8 M
	b)	A grating has 6000 *lines/cm*. Find the angular separation between two wavelengths 500 *nm* and 510 *nm* in the third order spectrum	4 M

UNIT-III

5.	a)	With the help of suitable diagrams explain the principle, construction and working of *He-Ne* gas laser.	8 M
	b)	Obtain the relation between Einstein's coefficients	4 M
		(OR)	
6.	a)	Explain with neat diagram the principle, construction and working of a semiconductor laser. What are its merits and demerits?	10 M
	b)	Explain why two level pumping is not suitable for obtaining population inversion	2 M

UNIT-IV

7.	a)	What is Optical fiber? Explain the principle of Optical fiber.	6 M
	b)	Derive expressions for Acceptance angle and Numerical Aperture of an Optical fiber.	6 M
		(OR)	
8.	a)	The numerical aperture of optical fiber is 0.2 when surrounded by air. Given the refractive index of cladding is 1.59. Find the acceptance angle when the fiber is in water. Assume refractive index of water as 1.33.	4 M
	b)	Explain step-index, graded index, single-mode and multi-mode fibre with relevant sketches.	8 M

UNIT-V

9.	a)	Describe diamagnetic, paramagnetic and ferromagnetic materials on the basis of permanent magnetic moment.	8 M
	b)	Explain ferromagnetic hysteresis on the basis of domains	4 M
		(OR)	
10.	a)	Show that every superconductor is perfect diamagnetic by meissner effect.	6M
	b)	Describe the differences between Type-I and Type-II superconductors.	6 M

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AR16

CODE: 16BS1003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech I / I B.Tech II Semester Supplementary Examinations, October-2021

ENGINEERING PHYSICS

(Common to All 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.	6M
	b)	What are the conditions to obtain the maximum and minimum intensities in the reflected light due to thin parallel film.	8M
		(OR)	
2.	a)	Comparison between interference and diffraction of light.	4M
	b)	Explain in detail Fraunhofer diffraction of light due to a single slit.	10M

UNIT-II

3.	a)	Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein's coefficients.	8M
	b)	Write the applications of lasers in industry and medical fields.	6M
		(OR)	
4.	a)	Derive expressions for the numerical aperture and fractional index change of optical fiber.	8M
	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.	6M

UNIT-III

5.	a)	Derive time independent Schrodinger's wave equation	8M
	b)	What is the physical significance of wave function.	6M
		(OR)	
6.	a)	Derive an expression for the wave function and energy of a particle confined in a one dimensional potential box using Schrodinger's wave equation.	10M
	b)	Calculate the energy difference between the ground state and the first excited state for an electron in a box of length 1.0 A^0.	4M

UNIT-IV

7.	a)	What is Bohr magnetron?. How it is related to magnetic moment of electron.	8M
	b)	Define the terms i) Magnetic induction ii) Magnetization and iii) Magnetic susceptibility.	6M
		(OR)	
8.	a)	Discuss the domain theory of ferromagnetism	10M
	b)	Show that $B= \mu_0(M + H)$	4M

UNIT-V

9.	a)	Explain electronic polarizability in atoms and obtain an expression for electronic polarizability in terms of radius of the atoms.	8M
	b)	What are dielectrics? Differentiate between polar and nonpolar dielectrics.	6M
		(OR)	
10.	a)	What is dielectric loss? Obtain an expression for tangent loss.	6M
	b)	Describe ferroelectric hysteresis. Explain the saturation polarization, remnant polarization and coercive field.	8M

AR13

Code: 13BS1004 **SET-I**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I / I B.Tech II Semester Supplementary Examinations, October-2021
ENGINEERING PHYSICS
(Common to All Branches)

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 displacement 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) With ray diagram discuss the theory of thin parallel film and derive the conditions for constructive and destructive interference of light by reflection. 8M
   b) A parallel beam of light of wavelength 5890A^0 is incident on a glass plate having refractive index is 1.5 such that the angle of refraction in the plate is 60^0 calculate the smallest thickness of the plate which will appear dark by reflected light. 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 interference and diffraction of light. 4M

UNIT-II

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

(OR)

5. a) Explain the principle behind the functioning of an optical fiber. 4M
   b) Distinguish between single mode and multimode fibers 8M

UNIT-III

6.	a)	Explain Structure and packing factor of Body centered cubic crystal	8M
	b)	Define the following. i) Atomic radius ii) Coordination number iii) Packing fraction and iv) Primitive cell.	4M

(OR)

7.	a)	What are the Miller indices? How they are obtained and mention their physical significance.	8M
	b)	State and explain Bragg's law for X-ray diffraction.	4M

UNIT-IV

8.	a)	What is Bohr magneton. Find the magnetic moments due to orbital and spin motion of electrons.	8M
	b)	Derive relation between Magnetic susceptibility and relative permeability	4M

(OR)

9.	a)	Derive relation between electric susceptibility and dielectric constant.	4M
	b)	What is electronic polarization and derive the expression for its polarizability**.**	8M

UNIT-V

10.	a)	Derive an expression for electrical conductivity of metal based on classical free electron theory.	8M
	b)	Discuss various drawbacks of classical free electron theory.	4M

(OR)

11.	a)	Derive Schrodinger's time independent wave equation for a particle in one dimension.	8M
	b)	Write the physical significance of Schrodinger's wave equation.	4M

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