Q.P Code: 23PH102

Hall Ticket No.:

NARSIMHAREDDY ENGINEERING COLLEGE
(UGC AUTONOMOUS)
I B.Tech I Semester (NR23) Regular Examination, January/February 2024
APPLIED PHYSICS
(Common to CSE, IT)

Time : 3 hours   Maximum marks: 60

Note:
- This question paper contains two parts, A and B
- Part A is compulsory which carries 10 marks (10 sub questions are two from each unit carry 1 Marks). Answer all questions in Part A
- Part B Consists of 5 Units. Answer one question from each unit. Each question carries 10 Marks and may have a, b sub questions

Part-A
Answer all questions   (10 Marks)

Q.No		Question	M	CO	BL
1)	a	What are matter waves?	1	CO1	L1
	b	Mention a few drawbacks of the classical theory of the free electron.	1	CO1	L2
	c	List out the majority and minority charge in n-type and p-type semiconductors.	1	CO2	L1
	d	Draw CE, CB, and CC configurations of an n-p-n transistor.	1	CO2	L3
	e	Define electric dipole and dipole moment?	1	CO3	L1
	f	Mention a few applications of soft magnetic materials.	1	CO3	L2
	g	What is surface to volume ratio?	1	CO4	L1
	h	What are the various methods in the characterization of materials?	1	CO4	L1
	i	Differentiate between laser light and conventional light?	1	CO5	L2
	j	Why optical fiber communication is beneficial than traditional communication systems?	1	CO5	L1

Part-B
Answer all the Units
All Questions carry equal Marks   (50 Marks)

Q.No		Question	M	CO	BL
		UNIT–I			
2)	a	Explain the photoelectric effect.	5	CO1	L2
	b	Show that $\lambda = \frac{1.227}{\sqrt{V}}$ nm	5	CO1	L3
		OR			
3)		Explain Kronig – Penny Model.	10	CO1	L3
		UNIT–II			
4)	a	Classify extrinsic semiconductors. Compare n-type and p-type semiconductors.	6	CO2	L4
	b	Draw the V – I characteristics of a PN junction diode.	4	CO2	L3

5)	a	Write the statement of the Hall effect.	2	CO2	L3
	b	Derive expression for Hall voltage?	8	CO2	L4
		OR			
		UNIT–III			
6)	a	Define internal field?	2	CO3	L2
	b	Derive an expression for the internal field.	8	CO3	L3
		OR			
7)	a	What is hysteresis?	2	CO3	L2
	b	Explain the hysteresis behavior of ferromagnetic materials with a neat diagram.	8	CO3	L3
		UNIT–IV			
8)	a	Explain any one method in the top-down approach.	5	CO4	L3
	b	What are the applications of nanomaterials?	5	CO4	L2
		OR			
9)	a	What are the properties of nanomaterials?	5	CO4	L2
	b	Compare various characterization techniques.	5	CO4	L3
		UNIT–V			
10)	a	Explain the construction and working of CO_2 laser.	7	CO5	L3
	b	What are the applications of laser in the medical field.	3	CO5	L2
		OR			
11)	a	Define acceptance angle and numerical aperture.	2	CO5	L2
	b	Derive expressions for them.	8	CO5	L3

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Hall Ticket No.:

NARSIMHAREDDY ENGINEERING COLLEGE
(UGC AUTONOMOUS)
I B.Tech II Semester (NR23) Regular Examination, July 2024
APPLIED PHYSICS
(Common to CE, EEE, ME, ECE, CSE (CS), CSE (AI&ML))

Time : 3 hours   Maximum marks: 60

Note:
- This question paper contains two parts, A and B
- Part A is compulsory which carries 10 marks (10 sub questions are two from each unit carry 1 Marks). Answer all questions in Part A
- Part B Consists of 5 Units. Answer one question from each unit. Each question carries 10 Marks and may have a, b sub questions

Part-A
Answer all questions
(10 Marks)

Q.No		Question	M	CO	BL
1)	a.	State Heisenberg's uncertainty principle.	1	CO1	L1
	b.	Evaluate the wavelength of an electron accelerated with potential 100V.	1	CO1	L4
	c.	List any two use of Zener diode.	1	CO2	L2
	d.	Draw the symbol of n-p-n BJT.	1	CO2	L4
	e.	Write the relation between D, E and P	1	CO3	L3
	f.	Define magnetostriction.	1	CO3	L1
	g.	What you understand about quantum confinement.	1	CO4	L2
	h.	Why the one Nano meter is magical point on the dimension scale	1	CO4	L5
	i.	What is the main function of Optical Resonator?	1	CO5	L2
	j.	Define acceptance angle.	1	CO5	L1

Part-B
Answer all the Units
All Questions carry equal Marks
(50 Marks)

Q.No		Question	M	CO	BL
		UNIT-I			
2)	a.	What is a block body? Demonstrate briefly the distribution of energy in a blackbody spectrum.	5	CO1	L3
	b.	Identify the salient feature of Kronig-Penny Model.	5	CO1	L3
		OR			
3)	a.	Show that the energy of particle in a 1D box is quantised.	5	CO1	L3
	b.	Choose any five differences between conductors, insulators and semiconductors based on the band theory of solids.	5	CO1	L3
		UNIT-II			
4)	a.	Compare direct and indirect band gap semiconductors.	5	CO2	L4
	b.	Explain the principle and construction of LED.	5	CO2	L4
		OR			
5)	a.	What is Hall effect? Describe an experimental setup to measure the Hall voltage.	5	CO2	L4

Q.No		Question	M	CO	BL
	b.	State the principle of solar cell with neat sketch. Discuss the construction of solar cell with neat sketch.	5	CO2	L4
		UNIT-III			
6)	a.	Distinguish between electronic, ionic, orientation polarizations.	5	CO3	L3
	b.	What is hysteresis loop in Ferro magnet materials? What does it represent? What is its significance?	5	CO3	L3
		OR			
7)	a.	What is Ferro electricity? Mention the important properties of Ferro electrics.	5	CO3	L4
	b.	What are soft and hard magnetic materials? Give their characteristic properties.	5	CO3	L4
		UNIT-IV			
8)	a.	Discuss about various bottom up approach method for fabrication of Nano materials.	5	CO4	L4
	b.	Explain the working of TEM.	5	CO4	L2
		OR			
9)	a.	Justify why the surface area to volume ratio is very large for nanoparticles compared to bulk materials?	5	CO4	L5
	b.	Discuss various applications of Nano materials.	5	CO4	L3
		UNIT-V			
10)	a.	Write a note on construction of He-Ne gas Laser.	5	CO5	L2
	b.	List the applications of fiber optics in various fields.	5	CO5	L3
		OR			
11)	a.	Explain the working of semiconductor laser diode.	5	CO5	L2
	b.	Discuss about fiber optic communication with suitable diagram.	5	CO5	L3

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P Code: 23PH102

NARSIMHAREDDY ENGINEERING COLLEGE
(UGC AUTONOMOUS)
I B.Tech I Semester (NR23) Supplementary Examination, July 2024
APPLIED PHYSICS
(Common to CSE, IT)

Time : 3 hours

Maximum marks: 60

Note:
- This question paper contains two parts, A and B
- Part A is compulsory which carries 10 marks (10 sub questions are two from each unit carry 1 Marks). Answer all questions in Part A
- Part B Consists of 5 Units. Answer one question from each unit. Each question carries 10 Marks and may have a, b sub questions

Part-A
Answer all questions

(10 Marks)

Q.No		Question	M	CO	BL
1)	a	Write an expression for Stefan-Boltzmann law?	1	CO1	L1
	b	Find the minimum energy level for an electron in a 1-D potential box.	1	CO1	L1
	c	Draw Fermi (EF) energy level in intrinsic, p- type and n-types semiconductors.	1	CO2	L2
	d	Distinguish between direct and indirect bandgap semiconductors?	1	CO1	L2
	e	Define dielectric polarization. Classify?	1	CO1	L1
	f	Mention few applications of magnetic field sensors?	1	CO1	L2
	g	Classify the nanomaterials.	1	CO1	L2
	h	What are the advantages of nanomaterials?	1	CO1	L1
	i	Define pumping?	1	CO1	L1
	j	Calculate the acceptance angle of an optical fiber of core and cladding of refractive indices 1.45 and 1.30.	1	CO1	L3

Part-B
Answer all the Units
All Questions carry equal Marks

(50 Marks)

Q.No		Question	M	CO	BL
		UNIT-I			
2)	a	Distinguish between electromagnetic wave and matter wave?	3	CO1	L3
	b	Explain de Broglie's hypothesis.	7	CO1	L3
		OR			
3)	a	Discuss Drude – Lorentz's theory of free electrons.	6	CO1	L2
	b	Classify solids based on energy bands.	4	CO1	L2
		UNIT-II			
4)	a	Compare direct and indirect band gap semiconductors	6	CO2	L3
	b	Explain the construction and working of LED.	4	CO2	L2
		OR			

Q.No		Question	M	CO	BL
5)	a	What is a bipolar junction transistor? Identify its parts?	3	CO2	L2
	b	Explain various methods of transistor configuration. Which configuration of most suitable?	7	CO2	L3
		UNIT-III			
6)	a	Define electric dipole, dipole moment, and susceptibility.	3	CO3	L2
	b	Deduce expression for Clausius – Mosotti equation.	7	CO3	L3
		OR			
7)	a	Explain the domain theory of ferromagnetism.	5	CO3	L2
	b	Distinguish between soft and hard magnetic materials.	5	CO3	L4
		UNIT-IV			
8)	a	Explain quantum confinement and surface-to-volume ratio.	6	CO4	L2
	b	What are the various applications of nanomaterials.	4	CO4	L2
		OR			
9)	a	Explain the ball milling method.	5	CO4	L3
	b	What is the principle of the XRD method? Mention a few applications of nanomaterials.	5	CO4	L2
		UNIT-V			
10)	a	Explain Einstein's coefficients.	7	CO5	L2
	b	List the various methods in pumping.	3	CO5	L3
		OR			
11)	a	Label various parts of an optical fiber using a neat diagram.	3	CO5	L3
	b	Explain optical fiber communication system.	7	CO5	L3

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Code No: 132AF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech I Year II Semester Examinations, May - 2019
APPLIED PHYSICS
(Common to CE, ME, MCT, AE, MIE, PTM, CEE, MSNT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	Define stress, strain and write their units.	[2]
b)	Define Poisson's ratio.	[3]
c)	What is the Sabine's formula? Explain	[2]
d)	What is acoustic quieting?	[3]
e)	What is Piezoelectric effect?	[2]
f)	What are the properties of ultrasonics?	[3]
g)	Explain dielectric constant & electrical susceptibility.	[2]
h)	Distinguish between Ferro-electricity and Piezoelectricity.	[3]
i)	What is Bohr magneton?	[2]
j)	Explain ferromagnetism.	[3]

PART-B

(50 Marks)

2. What is the Torsional pendulum? Explain how it is used to determine the rigidity modulus of a given wire. [10]

OR

3. Derive the relation between three modules of elasticity. [10]

4. Explain various factors affecting architectural acoustics and their remedies. [10]

OR

5.a) What are the requisites for good acoustics?
  b) Describe the method of measurement of sound absorption coefficient. [4+6]

6. Explain how the ultrasonic waves produced with the help of piezoelectric method. [10]

OR

7. Describe in detail applications of ultrasonic waves [10]

8.a) Explain the electronic polarizability in atoms and obtain an expression for electronic polarizability in terms of the radius of the atom.

b) The radius of a gaseous atom is 0.062nm. Calculate the electronic polarizability of the gas and its relative permittivity. Given that the number of atoms of the gas is 2.7×10^{25} per m^3. [8+2]

OR

9.a) Explain in detail the structure of $BaTiO_3$ and write its applications.

b) Derive an expression for ionic polarizability in an ionic solid. [5+5]

10.a) Explain the origin of magnetic moment and also explain classification of magnetic materials.

b) Describe Hysteresis behavior of ferromagnetic material. [5+5]

OR

11.a) Describe the properties of superconductors.

b) What are important applications of superconductors? Explain in detail. [4+6]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, September/October - 2021
APPLIED PHYSICS
(Common to ECE, EIE, ECM, CSBS, CSE(AI&ML), CSE(IOT))

Time: 3 Hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Show that the energies of a particle in a one dimensional potential box are quantized.
 b) Find the probability of finding a particle between 0.35a and 0.65a where 'a' is the width of the box and particle is in the first excited state.   [10+5]

2.a) Describe the Davisson and Germer's experimental for verification of matter waves.
 b) Electrons are accelerated through 344 volts and are reflected from a crystal. The first reflection maximum occurs when glancing angle is 60^0. Determine the spacing of the crystal. Given h = 6.62×10^{-34} Joule-sec, e=1.6×10^{-19} C and m_e=9×10^{31}kg.   [10+5]

3.a) What is a PN-junction diode? Discuss the V-I characteristics of a diode in both the biasing conditions.
 b) Explain advantage of Zener diode over P-N junction diode.   [10+5]

4.a) Explain the Hall effect in metal? Derive the formulae to determine Hall coefficient and mobility of electrons.
 b) An n-type germanium sample has a donor density of 10^{21}/m^3. It is arranged in a Hall experiment having magnetic field of 0.5T and the current density is 500 A/m^2. Find the Hall voltage if the sample is 3mm wide.   [10+5]

5.a) What is an LED? Explain the working of LED with a neat diagram.
 b) Write a short note on solar cell.   [10+5]

6.a) What are semiconductor diode lasers? Describe the construction and working of a semiconductor laser with energy band diagram.
 b) Discuss advantages of diode lasers over gas lasers.   [10+5]

7.a) Draw the block diagram of an optical fibre communication system and explain the function of each block.
 b) Consider a fibre having a core of index 1.48, a cladding of index 1.46 and has a core diameter of 30 mm. Show that all rays making an angle less than 9.43^0 with the axis will propagate through the fibre.   [10+5]

8.a) State and explain the basic laws of electromagnetism in their integral form.
 b) Distinguish between conduction current and displacement current.   [10+5]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, September/October - 2021
APPLIED PHYSICS
(Common to ECE, EIE, CSE, IT, CSIT and SE subjects)

Time: 3 Hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks

1.a) Are the energies of a particle in one dimensional potential box quantized?
   b) Find the de-Broglie wavelength of a proton whose energy is 100 MeV when it is the free and if there is finite Potential well state.   [5+10]

2.a) Describe the Davisson and Germer's experimental for confirmation of matter waves.
   b) Electrons are accelerated through a 54 volt and are reflected from a crystal. The first reflection maximum occurs when glancing angle is 50°. Determine the spacing of the crystal. Given (h = 6.62 ×10⁻³⁴ J-s, mass of electron = 9.1 ×10⁻³¹ kg, θ = 50°).   [10+5]

3.a) What is a Photodiode, draw it facing the V-I characteristics of a diode in both the biasing conditions.
   b) Explain advantage of Zener diode over a P-N junction diode.   [10+5]

4.a) Explain the Hall effect in metals. Derive the formulae to determine Hall coefficient and mobility of electrons.
   b) An n-type germanium sample has a donor density of 10²¹/m³. It is arranged in a Hall experiment having magnetic field of 0.5T and the current density is 500 A/m². Find the Hall voltage if the sample is 3mm wide.   [10+5]

5.a) What is an LED? Explain the working of LED with a neat diagram.
   b) Write a short notes on solar cell.   [10+5]

6.a) What are semiconductor diode lasers? Describe the construction and working of a semiconductor laser with energy band diagram.
   b) Discuss advantages of diode lasers over gas lasers.   [10+5]

7.a) Draw the block diagram of an optical fibre communication system and explain the function of each block.
   b) Consider a fibre having a core of index 1.48, a cladding of index 1.46 and has a core diameter of 30 mm. Show that all rays making an angle less than 9.43° with the axis will propagate through the fibre.   [10+5]

8.a) Special explain the basic laws of electromagnetism in their integral form.
   b) Distinguish between conduction current and displacement current.   [10+5]

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Code No: 152AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, November/December - 2020
APPLIED PHYSICS
(Common to CSE, IT, ITE)

Time: 2 hours　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) What is Compton effect? Explain in detail.
　b) Calculate the velocity and kinetic energy of an electron having wavelength of 0.21nm.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[9+6]

2.a) Discuss Born's interpretation of the wave function.
　b) Derive the expression for de-Broglie's wavelength.　　　　　　　　[7+8]

3.a) Discuss n-type semiconductors fermi level variation with respect to carrier concentration and temperature.
　b) Derive an expression for carrier generation and recombination.　　　[8+7]

4.a) What is Hall effect? Derive an expression of Hall Coefficient.
　b) Distinguish between n- type and p-type semiconductors.　　　　　[9+6]

5.a) Write a note on Avalanche photodiode.
　b) What is a radiative and non- radiative recombination mechanism in semiconductors?
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[9+6]

6.a) Describe in detail with a neat diagram LED construction and working principle.
　b) What are the characteristics of Solar cell?　　　　　　　　　　　[9+6]

7.a) With necessary theory and energy level diagram explain the working of He-Ne gas laser.
　b) Write a note on Losses associated with optical fibers.　　　　　　　[9+6]

8.a) Obtain an expression for the Internal field seen by an atom in an infinite array of atoms subjected to an external field.
　b) Write a note on ferromagnetic domains.　　　　　　　　　　　　　[9+6]

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Code No: 152AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, September/October - 2021
APPLIED PHYSICS
(Common to EEE, CSE, IT, CSIT, ITE, CE(SE), CSE(CS), CSE(DS), CSE(Networks))

Time: 3 Hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) In detail describe Photoelectric effect.
  b) Discuss Heisenberg's Uncertainty principle.   [7+8]

2.a) Write a note on Carrier generation and recombination.
  b) Explain Photo-electric effect and Compton Effect in detail.   [7+8]

3.a) Describe formation of depletion region in p-n junction diode.
  b) Explain operation of principle of BJT.
  c) What are the applications of p-n junction diode?   [6+6+3]

4.   Explain about Zener diode with its characteristics.   [15]

5.   What is Lasing action? Explain in detail. Discuss construction and working of
      semiconductor lasers with diagram.   [15]

6.   With suitable diagram explain construction and working principle of He-Ne laser system.
                                                                           [15]

7.a) What are losses associated with optical fibers? Explain in detail.
  b) What is "total internal reflection"? Discuss about applications of Optical fibers.   [7+8]

8.   Discuss in detail about "Hysteresis loop". Mention some of the applications of magnetic
      materials.   [15]

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