JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
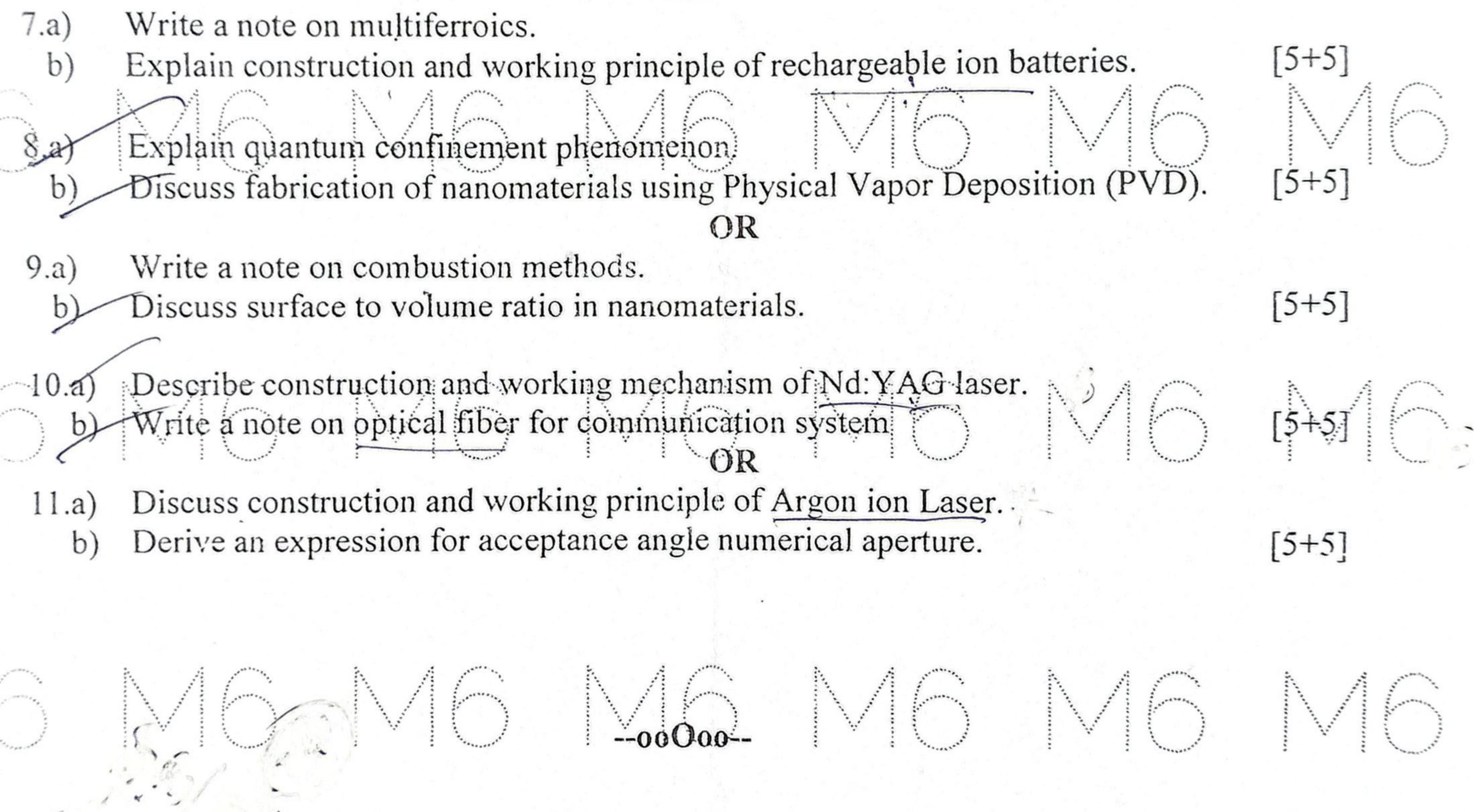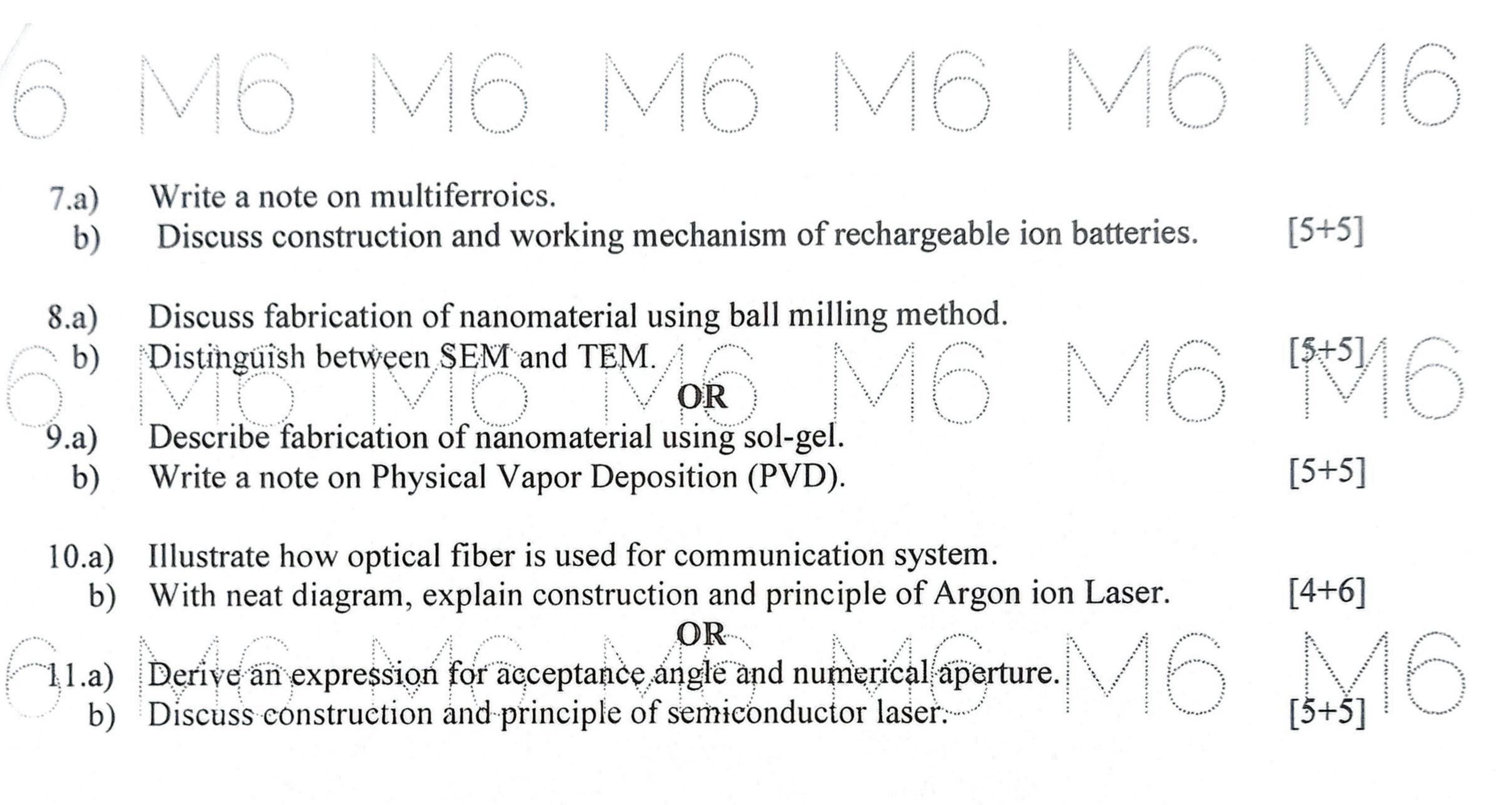## B. Tech I Year I Semester Examinations, March/April - 2023
APPLIED PHYSICS
(Common to CE, ME, ECE, EIE, AE, BT, MIE, PCE, CSE(AI&ML), CSE(IOT), AI&DS, AI&ML)

Time: 3 Hours

Max. Marks: 60

Note: This question paper contains two parts A and B.
i) Part- A for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A
(10 Marks)

1.a)	What is blackbody?	[1]
b)	Define Symmetry in solids	[1]
c)	State Hall effect.	[1]
d)	List out applications of BJT.	[1]
e)	State pyroelectric.	[1]
f)	What are the applications of Energy Materials?	[1]
g)	Define Nano.	[1]
h)	Illustrate applications of nanomaterials.	[1]
i)	What is acronym LASER?	[1]
j)	What is total internal reflection?	[1]

PART - B
(50 Marks)

2.a) Explain Stefan-Boltzmann's law.
b) Discuss Born interpretation of the wave function. [5+5]

OR

3.a) List out assumptions of Drude & Lorentz free electron theory.
b) Explain Fermi-Dirac distribution of electrons. [5+5]

4.a) Explain working principle of Zener diode.
b) Illustrate working mechanism of PIN diode in forward and reserve bias. [5+5]

OR

5.a) With a neat diagram, describe working principle of Avalanche Photo Diode (APD).
b) Distinguish between intrinsic and extrinsic semiconductors. [5+5]

6.a) What is ferroelectricity? Explain properties of ferroelectric materials.
b) Write a note on bubble memory devices. [5+5]

OR

7.a) Write a note on multiferroics.
  b) Explain construction and working principle of rechargeable ion batteries.   [5+5]

8.a) Explain quantum confinement phenomenon.
  b) Discuss fabrication of nanomaterials using Physical Vapor Deposition (PVD).   [5+5]

OR

9.a) Write a note on combustion methods.
  b) Discuss surface to volume ratio in nanomaterials.   [5+5]

10.a) Describe construction and working mechanism of Nd:YAG laser.
  b) Write a note on optical fiber for communication system   [5+5]

OR

11.a) Discuss construction and working principle of Argon ion Laser.
  b) Derive an expression for acceptance angle numerical aperture.   [5+5]

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Code No: 182AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year II Semester Examinations, September - 2023
APPLIED PHYSICS
(Common to EEE, CSE, IT, CSIT, CE (SE), CSE (CS), CSE (DS), CSD)
Time: 3 Hours   Max. Marks: 60

Note: This question paper contains two parts A and B.
   i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.
   - Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
   - Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

                                                                  (10 Marks)

1.a)	What is photoelectric effect?	[1]
b)	Draw E-K diagram.	[1]
c)	What is Hall Effect?	[1]
d)	List out applications of BJT.	[1]
e)	Define ferroelectricity.	[1]
f)	Draw B-H curve.	[1]
g)	What is Nanotechnology?	[1]
h)	List out few examples for top-down fabrication techniques.	[1]
i)	Illustrate application of optical fiber.	[1]
j)	Explain significance of pumping process.	[1]

PART-B

                                                                  (50 Marks)

2.a)	Calculate energy of particle exist in one dimensional potential box.	
b)	Derive an expression for effective mass of electron.	[5+5]
	OR	
3.a)	Discuss Kronig-Penney model.	
b)	Describe classification of solids on the basis of band theory.	[6+4]
4.a)	Discuss construction and working mechanism of Solar cell.	
b)	Explain construction and characteristics of P-N Junction diode.	[5+5]
	OR	
5.a)	Describe construction and principle of APD.	
b)	Explain construction of LED.	[6+4]
6.a)	Describe construction and principle of Liquid Crystal Displays (LCD).	
b)	Explain working mechanism of bubble memory devices.	[6+4]
	OR	

7.a) Write a note on multiferroics.
  b) Discuss construction and working mechanism of rechargeable ion batteries.   [5+5]

8.a) Discuss fabrication of nanomaterial using ball milling method.
  b) Distinguish between SEM and TEM.   [5+5]

OR

9.a) Describe fabrication of nanomaterial using sol-gel.
  b) Write a note on Physical Vapor Deposition (PVD).   [5+5]

10.a) Illustrate how optical fiber is used for communication system.
   b) With neat diagram, explain construction and principle of Argon ion Laser.   [4+6]

OR

11.a) Derive an expression for acceptance angle and numerical aperture.
   b) Discuss construction and principle of semiconductor laser.   [5+5]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year I Semester Examinations, January/February - 2024
APPLIED PHYSICS
(Common to CE, ME, ECE, EIE, AE, BT, MIE, PCE, CSE(AI&ML), CSE(IOT), AI&DS, AI&ML)

Time: 3 Hours

Max. Marks: 60

Note: This question paper contains two parts A and B.

i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
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PART- A

(10 Marks)

1.a) State the Planck's radiation law. [1]
 b) Draw E-K diagram of free electron. [1]
 c) Why silicon is not used to make LED? [1]
 d) Write the difference of Diode and Zener Diode. [1]
 e) Distinguish polar and nonpolar dielectrics [1]
 f) Write the significance of hysteresis loop in magnetism. [1]
 g) Classify the Nanomaterials according to Quantum confinement. [1]
 h) Mention the nanoscale for which a material can be called as nanomaterial. [1]
 i) Give an example of each atomic laser and molecular laser. [1]
 j) Which optical fiber is used for long distance communication? [1]

PART - B

(50 Marks)

2.a) Explain the concept of the Heisenberg's uncertainty principle. Using Heisenberg's uncertainty principle, prove that electron cannot stay in the nucleus of an atom.
 b) Describe the findings of photoelectric effect.
 c) How does the classical theory fail to explain the photoelectric effect? [5+2+3]

OR

3.a) What does it mean by free and bound electrons? Discuss the important postulates of free electron theory of metals.
 b) Explain the Bloch's theorem and show how it leads to energy band stature of solids.
 [5+5]

4.a) Derive voltage expression and working of the Bipolar Junction Transistor (BJT).
 b) Describe construction and principle of LED. [5+5]

OR

5.a) Describe the I-V characteristics of solar cell and photo diode.
  b) Write the working principle of PIN and Avalanche photo detectors. [5+5]

6.a) What do you mean by internal field? Derive the expression for internal field for solids.
  b) Derive Clausius-Mososotti relationship for cubic solids. [7+3]

OR

7.a) Analyse the working of liquid crystal display.
  b) Analyse the working and characteristics of solid fuel cells. [5+5]

8.a) Define bottom-up fabrication method of nano materials.
  b) Explain Sol-Gel synthesis for producing nanomaterials with proper diagram of each steps. [3+7]

OR

9.a) How the characterization techniques XRD and SEM are used for nanomaterials? Explain.
  b) Write application of nanomaterials for medical technology and civil engineering. [7+3]

10.a) Describe construction and working mechanism of Argon ion Laser.
  b) Write a note on optical fiber for communication system. [5+5]

OR

11.a) With neat diagram, explain Nd: YAG laser system.
  b) Explain construction of optical fiber. [6+4]

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