

[Total No. of Ques. 5]

Seat No:

[Total No. of Pages: 02]

G H Raisoni College of Engineering and Management, Pune.
(An Empowered Autonomous Institution affiliated to Savitribai Phule, Pune University)

FY B.TECH (All) (TERM- I)
ESE WINTER 2025 (2023 Pattern)
Engineering Physics (23UBSL1204)

[Time: 2:30 Hours]

[Max. Marks-60]

Instructions to the candidates:

- 1) All questions compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- 5) $e = 1.6 \times 10^{-19} C$, $h = 6.63 \times 10^{-34} J \cdot s$, $m_e = 9.1 \times 10^{-31} kg$, $c = 3 \times 10^8 m/s$

Q. No.	Sub Ques.	Marks	CO	BL
1	a) Draw a neat labeled block diagram of Cathode ray oscilloscope (CRO). Mention different parts of CRO. Explain use of CRO for determination of unknown frequency of signal.	[6]	CO1	L2
	b) Discuss the refraction of electron beam across equipotential surface. Compare between electron beam refraction and refraction of light beam.	[6]	CO1	L2
2	a) A thin film of uniform thickness is illuminated by monochromatic light. Obtain an expression for path difference for interference of rays in reflected media. Also write the conditions for maxima and minima.	[6]	CO2	L3
	OR			
	b) Apply the concept of thin film interference and briefly discuss following processes: (i) Testing of flatness of transparent surface (ii) Antireflection coating	[6]	CO2	L3
	c) An engineer wants to reduce the loss of light due to reflection and increase transmitted part of light on glass lens (refractive index=1.5) using coating of following thin films: (i) MgF_2 (refractive index = 1.38) (ii) ZnS (refractive index = 2.37) Assume $\lambda = 5560 \text{ \AA}$ Find the thickness of coating of both the thin films. Which of these materials will be preferred for thin film coating?	[6]	CO2	L3
3	a) With the help of energy level diagram, discuss the construction and working of He-Ne Laser,	[6]	CO2	L2
	b) Differentiate between spontaneous and stimulated emission.	[3]	CO3	L3
	c) Mention important characteristics of Laser. Which of these characteristics make it useful for Holography?	[3]	CO3	L2
4	a) Draw Fermi level diagram for symmetrically doped p-n junction diode under following conditions: (i) Zero biased (ii) Forward biased	[4]	CO4	L3

- b) List at least four applications of Solar cell. [2] CO3 L1
- c) Compare between LED and OLED [6] CO3 L3
A LED is emitting photon of wavelength 652.6 nm. Calculate the band gap of material used for construction of LED.
- 5 a) Derive an expression for De-Broglie wavelength in terms of Kinetic energy and accelerating voltage. [4] CO4 L3
- b) Apply De-Broglie hypothesis and derive Schrodinger's time independent equation. [6] CO4 L3
- OR
- c) Explain Heisenberg's uncertainty principle and prove it by using single slit experiment. [6] CO4 L3
- d) Calculate velocity of an electron of wavelength 1.66 \AA . [2] CO4 L3
-

