



	WINTER-2023		
	Exam Seat No.:		
	Academic Year: 2023-2024	Semester: I	
	Name of Programme: F.Y.B.Tech	Pattern: 2023	
	Name of Course: Applied Physics (B)	Course Code: 2300103B	
	Max. Marks: 60	Duration: 2.50 Hrs.	

	<p>Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none">1. This question paper contains 3 pages.2. Answer to each new question is to be started on a new page.3. Assume suitable data wherever required, but justify it.4. Draw the neat labelled diagrams, wherever necessary.5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question. <p>Constants : Charge of an electron = 1.6×10^{-19} C</p> <p> Mass of electron = 9.1×10^{-31} Kg</p> <p> Acceleration due to gravity = 9.81 m/s^2</p>	
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Question No. 1 Attempt following Question

- 1a) Explain the terms displacement and average velocity. (2) CO1
- 1b) The position of a particle is given by $x = 3t^3 - 4t^2 + 3t$. Determine velocity 'v' & acceleration 'a' of a particle when $t = 3 \text{ sec}$. (4) CO4

Question No. 2 Attempt following Question

- 2a) Define the terms horizontal range and trajectory related to a projectile motion. (2) CO1
- 2b) The motion of a particle is defined by the relations : $x = 3t^2 + 2t$ and $y = t^3 - 8t^2 + 4$ where x and y are in meters and t is in seconds. Calculate the velocity and acceleration of the particle at time $t = 2$ seconds. (4) CO4

Question No. 3 Attempt following Question

- 3a) Explain the term superconductivity and hence differentiate between type I and II superconductors. (6) CO2

OR

3b) Explain Hall effect in semiconductor. Derive the equation for Hall voltage and Hall coefficient. (6) CO1

3c) What is Fermi Energy in Semiconductor? With the help of neat labeled diagram draw position of Fermi level in p-type semiconductor at 0K and 300K. (6) CO1

OR

3d) Explain the term nano technology and hence explain how quantum confinement affects properties of nano particles. (6) CO1

3e) Find the mobility of electrons in copper if there are 9×10^{28} valence electrons / m^3 and the conductivity of copper is 6×10^7 mho / m. (4) CO4

OR

3f) The transition temperature for lead is 7.26 K. The maximum critical field for the material is 8×10^5 A/m. Lead has to be used as a superconductor subjected to a magnetic field of 4×10^4 A/m. At what maximum temperature it can be operated. (4) CO4

Question No. 4 Attempt following Question

4a) Explain the principal, construction and working of fibre optic. (6) CO1

OR

4b) Define unpolarized & polarized light. Hence state and prove the law of Malus. (6) CO1

4c) Define the following terms with diagram: (6) CO1
a) Resonant Cavity
b) Population Inversions
c) Spontaneous emission

OR

4d) Explain Antireflection Coating and derive the equation for the thickness of it. (6) CO1

4e) A parallel beam of light 622 nm incident on a glass plate of refractive index 1.50 such that angle of refraction into the plate is 60° . Calculate the smallest thickness of the plate which will appear dark by reflection. (4) CO4

OR

4f) Monochromatic light of wavelength 6.56×10^{-5} cm falls normally on a grating 2 cm wide. The first order spectrum is produced at an angle of $18^\circ 14'$ from the normal. What is the total number of lines on the grating? (4) CO4

Question No. 5 Attempt following Question

5a) Explain how to calculate the wind power and hence derive the unit of force and energy. (6) CO1

OR

5b) Explain the process of electron-hole pair generation and recombination. (6) CO5

5c) Explain the construction and working of a solar cell. Also draw the I-V characteristic of solar cell, define different parameters. (6) CO1

OR

5d) Explain how quantum dot technology is used in third generation solar cell. (6) CO5

5e) Explain wind farms and its three types.

(4) CO5

OR

5f) Explain with example –

(4) CO5

i) commercial and non-commercial energy sources

ii) renewable and non-renewable energy sources