

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov – Dec 2024		
Program: B.Tech Scheme: III 8 II		
Regula Examination: FY Semester: I		
Course Code: BSC102 and Course Name: Engineering Physics		
Date of Exam: 17-01-2025	Duration: 02 Hours	Max. Marks: 45

Instructions:				
(1) All questions are compulsory.				
(2) Draw neat diagrams wherever applicable.				
(3) Assume suitable data, if necessary.				
		Max. Marks	CO	BT level
Q 1	Solve any 5 questions out of six.	15		
i)	Draw the following planes in side cubic unit cell - $(1\ 2\ 3)$, (110) , $(2\bar{3}1)$	3	CO2	U
ii)	How is Newton's ring experiment used to determine refractive index of liquid?	3	CO4	U
iii)	Explain De Broglie hypothesis on the basis of Bohr's postulate.	3	CO1	U
iv)	n-type Ge sample has donor concentration $10^{21}/\text{m}^3$ and thickness = 3 mm is used in a Hall effect experiment set up. If $B = 0.5\text{ T}$, $J = 500\text{ A/m}^2$, Find Hall voltage.	3	CO3	App
v)	What are advantages of using super capacitors?	3	CO6	U
vi)	A superconducting tin has a critical temperature of 3.7 K at zero magnetic field and a critical field of 0.0306 Tesla at 0 K. Find the critical field at 2 K.	3	CO5	App
Q.2	Solve any three questions out of four.	15		
i)	Derive one dimensional Schrodinger's Time Independent wave equation for matter waves.	5	CO1	U
ii)	An electron is trapped in a one dimensional box of length 1 Å . Calculate the energy required to excite the electron from its ground state to the 1 st excited state.	5	CO1	App

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iii)	Explain principle, construction and working of a Light Emitting Diode on the basis of energy band diagram.	5	CO3	U
iv)	With a neat diagram, show the position of Fermi level in intrinsic semiconductor, n-type semiconductor and p-type semiconductor energy band diagram. What is the probability of an electron being thermally excited to conduction band in intrinsic Si at 27 °C. The band gap energy of Si is 1.12 eV.	5	CO3	App
Q.3	Solve any three questions out of four.	15		
i)	Obtain the relation between angle of wedge and fringe-width in wedge shaped film experiment.	5	CO4	U
ii)	State and explain Meissner's effect. Why superconductor is termed as a perfect diamagnet?	5	CO5	U
iii)	How can we determine crystal structure with observations obtained using Bragg's X-ray spectrometer?	5	CO2	U
iv)	A glass plate having thickness of 0.4×10^{-4} cm is illuminated by a beam of white light normal to the plate (refractive index for glass = 1.5). Calculate the wavelength within the limits of visible spectrum (4000 \AA to 7000 \AA) which will be intensified in the reflected beam.	5	CO4	App
