

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

*Supplementary Exam*

<i>April 2026</i>	<del>Nov-Dec</del> 2025 (First Half - Winter Examination 2025)	
Program: B. Tech. (Basic Sciences and Humanities) Scheme II & III		
Examination: FY Semester: I		
Course Code: BSC102 and Course Name: Engineering Physics		
Date of Exam: <del>8/02</del> /2026	Duration: 02 Hours	Max. Marks: 45

*08/04*

Instructions:				
(1) All questions are compulsory.				
(2) Draw neat diagrams wherever applicable.				
(3) Assume suitable data, if necessary.				
		Max. Marks	CO	BT level
<b>Q 1</b>	<b>Solve any 5 questions out of six</b>	<b>15</b>		
i)	State and explain Heisenberg's Uncertainty Principle.	3	CO1	U
ii)	Draw the following planes (1 1 0), (2 $\bar{3}$ 1) and (2 1 1)	3	CO2	U
iii)	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.	3	CO3	App
iv)	Why excessively thin films appear black?	3	CO4	U
v)	Critical field of Niobium is 10 <sup>5</sup> A/m at 8 K and 2 x 10 <sup>5</sup> A/m at 0 K. Calculate critical temperature of Niobium.	3	CO5	App
vi)	Compare supercapacitors with batteries.	3	CO6	U
<b>Q.2</b>	<b>Solve any three questions out of four.</b>	<b>15</b>		
i)	Derive one dimensional Time Dependent Schrodinger equation for matter waves.	5	CO1	U
ii)	A bullet of mass 40 gm and an electron both travel with the velocity of 1100 m/s. What wavelengths can be associated with them? Why the wave nature of bullet cannot be revealed using diffraction effect? Given: m = 9.1 X 10 <sup>-31</sup> kg	5	CO1	APP
iii)	Explain forward and reverse bias characteristics of semiconductor diode on the basis of energy band diagram.	5	CO3	U

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

Supplementary Exam

April 2026 <del>Nov-Dec-2025</del> (First Half - Winter Examination 2025)
Program: B. Tech. (Basic Sciences and Humanities) Scheme II & III
Examination: FY Semester: I
Course Code: BSC102 and Course Name: Engineering Physics
Date of Exam: <del>14/02</del> /2026      Duration: 02 Hours      Max. Marks: 45

08/04/

iv)	The n-type Ge sample has donor concentration $10^{21}/\text{m}^3$ and thickness = 3 mm across which Hall voltage is developed is used in a Hall effect experiment set up. If $B = 0.5 \text{ T}$ , $J = 500 \text{ A/m}^2$ , Find Hall Voltage $V_H$ and Hall Coefficient $R_H$ .	5	CO3	APP
<b>Q.3</b>	<b>Solve any three questions out of four.</b>	<b>15</b>		
i)	What are the miller indices? Derive an expression for inter-planar spacing for the planes having (h k l) as the miller indices.	5	CO2	U
ii)	Obtain optical path difference between rays reflected from upper surface and lower surface of a wedge shaped film.	5	CO4	U
iii)	In Newton's ring experiment, the diameter of the 4 <sup>th</sup> and 12 <sup>th</sup> dark rings are 0.4 cm and 0.7 cm respectively. Find the diameter of the 20 <sup>th</sup> dark ring.	5	CO4	APP
iv)	State and explain Meissner's effect with the help of a diagram.	5	CO5	U

\*\*\*\*\*