

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

Program: B.Tech. Scheme : III		
Examination: FY Semester: I		
Course Code: BSC102 and Course Name: Engineering Physics		
Date of Exam: _____	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)	Calculate the De Broglie wavelength associated with an electron accelerated by a potential difference of 100 kV.	3	CO1	App
ii)	Draw the Miller planes for (100), (110) and (111).	3	CO1	U
iii)	Find resistivity of intrinsic Germanium. Given the density of carriers is $2.5 \times 10^{19} / \text{m}^3$. The mobility of electrons is $0.39 \text{ m}^2 / \text{V-sec}$ and the mobility of holes is $0.19 \text{ m}^2 / \text{V-sec}$.	3	CO3	App
iv)	State the conditions for creating anti reflecting thin film on glass surface.	3	CO4	U
v)	The critical field of Niobium is 10^5 A/m at 8K and $2 \times 10^5 \text{ A/m}$ at absolute zero temperature. Calculate the critical temperature.	3	CO5	App
vi)	Compare the energy density and power density of a supercapacitor with that of a capacitor and a Battery.	3	CO6	U
Q.2	Solve any three questions out of four.	15		
i)	Derive one dimensional Time Dependent Schrodinger equation for matter waves.	5	CO1	U
ii)	An electron is trapped in a one-dimensional infinite potential box of length $2A^0$. Calculate the energy required to excite the electron from its ground state to the 4 th excited state.	5	CO1	APP
iii)	State and explain Hall effect with a neat diagram. Derive the expression for Hall voltage and Hall coefficient.	5	CO3	U
iv)	Fermi level for silver is 5.5 eV. What are the energies for which the probability of occupancy at 300 K is 0.99 and 0.01.	5	CO3	APP

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Q.3	Solve any three questions out of four.	15		
i)	Explain construction and working of Bragg's X-ray spectrometer.	5	CO2	U
ii)	Show that in Newton's ring experiment, diameter of n th dark ring is directly proportional to square root of n.	5	CO4	U
iii)	A wedge-shaped film of refractive index 1.25 is viewed normally in a light of wavelength 5893Å. If the angle of wedge is 1.666 X 10 ⁻⁴ radians, find the distance between two successive bright fringes.	5	CO4	APP
iv)	Enlist the differences between Type I and Type II superconductors.	5	CO5	U
