

<p>Program: B.Tech. (Basic Sciences and Humanities) Supplementary Examination : FY Semester: I Course Code: BSC102 and Course Name: Engineering Physics Date of Exam: 02-03-2024 Duration: 02 Hours Max. Marks: 45</p>
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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)	Explain De Broglie hypothesis on the basis of Bohr's postulate.	3	CO1	U
ii)	Calculate the wavelength of the wave associated with a neutron moving with energy 0.025eV. Mass of neutron is 1.676×10^{-27} kg.	3	CO1	APP
iii)	Draw the following planes in a cubic unit cell $-(101), (1\bar{1}2), (220)$	3	CO2	U
iv)	Show the position of Fermi level in intrinsic semiconductor, n-type semiconductor and p-type semiconductor energy band diagram.	3	CO3	U
v)	What is the nature of interference pattern in case of wedge shaped film experiment?	3	CO4	U
vi)	Define superconductivity. What do you mean by critical temperature?	3	CO5	U
Q.2	Solve any three questions out of four.	15		
i)	Using Heisenberg's Uncertainty Principle, show that electron cannot exist within the nucleus.	5	CO1	U
ii)	An electron is bound in a one dimensional potential well of width $2 A^0$ and of infinite height. Find its energy values in ground state and first two excited states.	5	CO1	APP
iii)	Show that for an intrinsic semiconductor, $E_F = \frac{E_C + E_V}{2}$ where symbols have their usual meaning.	5	CO3	U

Supplementary Exam (Feb/Mar 2024)

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iv)	Explain Hall effect with a neat diagram. n-type Ge sample has donor concentration $10^{21}/m^3$ and thickness = 3 mm is used in a Hall effect experiment set up. If $B = 0.5 T$, $J = 500 A/m^3$, Find Hall voltage.	5	CO3	APP
Q.3	Solve any three questions out of four.	15		
i)	Obtain Bragg's law of X-ray diffraction. Calculate the smallest glancing angle at which k-copper line of 1.549 \AA will be reflected from crystal having atomic spacing 4.255 \AA .	5	CO2	APP
ii)	Obtain the expression for effective path difference between two reflected rays in thin transparent film of uniform thickness.	5	CO4	U
iii)	White light falls normally on a soap film of refractive index 1.33 and thickness 5000 \AA . What wavelength within the visible spectrum ($\lambda = 4000 \text{ \AA}$ to 7000 \AA) will be strongly reflected?	5	CO4	APP
iv)	State and explain Meissner's effect with the help of a diagram.	5	CO5	U
