University of Mumbai
Examination 2020

Program: First Year Engineering
Curriculum Scheme: REV- 2016
Examination: First Year Semester I
Course Code: FEC102 and Course Name: Applied Physics-I

Time: 2 hour Max. Marks: 60

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Q.1 **30 Marks**	**Choose the correct option for the following questions. All the Questions are compulsory and carry equal marks.**
1.	Stacking sequence in face centered cubic (FCC) close packed structure is?
Option A:	AAAAA
Option B:	ABABAB
Option C:	ABCABC
Option D:	AABBAA
2.	When the temperature of either n-type or p-type increases, determine the movement of the position of the Fermi energy level?
Option A:	Towards up of energy gap
Option B:	Towards down of energy gap
Option C:	Towards Centre of energy gap
Option D:	Towards out of page
3.	Superconducting tin has a critical temperature of 3.7K at zero magnetic field and a critical field at 0.0306 Tesla at 0K. Find the critical field at 2K.
Option A:	0.0306 Tesla
Option B:	7.4 Tesla
Option C:	0.02166 Tesla
Option D:	0 Tesla
4.	When does a normal conductor become a superconductor?
Option A:	At normal temperature
Option B:	At Curie temperature
Option C:	At critical temperature
Option D:	Never
5.	What is the velocity when the electric field is 5V/m and the magnetic field is 5A/m?
Option A:	1m/s
Option B:	25m/s
Option C:	0.2m/s
Option D:	0.125m/s
6.	FCC structure having atomic radius is 1.414 Aº. Find the interplanar spacing for (2 0 0) planes.
Option A:	1.999 Aº
Option B:	2.999 Aº
Option C:	3.999 Aº

Option D:	1.555 Aº
7.	Calculate the Hall Effect coefficient when number of electrons in a semiconductor is 10^{20}
Option A:	0.625
Option B:	0.0625
Option C:	6.25
Option D:	62.5
8.	In Newton's ring experiment, the diameter of the 10^{th} ring changes from 1.40 to 1.23 cm when a liquid is introduced between the lens and glass plate. What is the refractive index of the liquid?
Option A:	1.05
Option B:	1.15
Option C:	1.25
Option D:	1.35
9.	Calculate decrease in acoustic intensity level when the sound intensity is reduced to half of its original intensity
Option A:	1 dB
Option B:	2 dB
Option C:	3 dB
Option D:	4 dB
10.	SONAR stands for
Option A:	Sound navigation and ranging
Option B:	Sound number approximation and ranging
Option C:	Sound nullifying ranging
Option D:	Sound measurement
11.	For a particle inside a box, the potential is maximum at x = _____
Option A:	L
Option B:	2L
Option C:	L/2
Option D:	3L
12.	The defect that occurs due to a displacement of an ion is known as _____
Option A:	Vacancy defect
Option B:	Schottky defect
Option C:	Frankel defect
Option D:	Interstitial defect
13.	How does a semiconductor behave at absolute zero?
Option A:	Conductor
Option B:	Insulator
Option C:	Semiconductor
Option D:	Protection device

14.	The loudness (or intensity) of a sound wave is related to its
Option A:	Duration
Option B:	Frequency
Option C:	Wavelength
Option D:	Amplitude
15.	Find the energy of Neutron in units of electron-Volt whose de-Broglie wavelength is 1 Aº. Given m_n= 1.674x10^{-27} Kg and h=6.62x 10^{-34} J.Sec
Option A:	0.012 eV
Option B:	0.021eV
Option C:	0.081eV
Option D:	0.018eV

Q.2 15 marks	**Solve any 3 out of 5** **5 Marks each**
A	Draw and explain the NaCl unit structure. Calculate coordination number and packing factor.
B	Explain Heisenberg's uncertainty principal and prove that electron cannot exist in a nucleus.
C	Derive the formula for conductivity for semiconductor.
D	Explain Type-I and type-II superconductor.
E	Calculate reverberation time for an empty hall of size 21x 16x10 m^3 with absorption coefficient 0.106

Q.3 15 marks	**Solve any 3 out of 5** **5 Marks each**
A	Show that for intrinsic semiconductor Fermi level lies in the middle of forbidden gap.
B	Explain production of Ultrasonic wave using piezo electric oscillator.
C	Find the hall coefficient of sodium assuming BCC structure of Na of lattice constant 4.28 Aº.
D	Derive Bragg's law.
E	Obtain time dependent Schrodinger equation.