



G.T.N. ARTS COLLEGE (AUTONOMOUS)

(Affiliated to Madurai Kamaraj University || Accredited with 'B' Grade by NAAC)

END SEMESTER EXAMINATION - NOVEMBER - 2021

(UNDER OUTCOME BASED EDUCATION (OBE) PATTERN)

Programme : M.Sc. Physics Date : 03.02.2022

Course Code: 20PPHC31 Time: 10:00 AM - 1:00 PM

Course Title: Solid State Physics - I Max. Marks: 60

Q. No.	SECTION - A (10 * 1 Answer ALL Q	, and the second se	CO(s)	K - Level
1.	How many atoms per unit cell are in hcp structure?		CO1	K2
	1.1	2.2		
	3.4	4.6		
2.	The atomic packing factor of BCC structure is	·	CO1	K1
	1.0.54	2.0.68		
	3.0.74	4.0.96		
3.	Phonons mean free path is to absolute temperature.		CO2	K2
	1.directly proportional	2.inversely proportional		
	3.linearly proportional	4.exponentially proportional		
4.	If the mean free path of charge carriers is high then K is		CO2	K2
	1.low	2.high		
	3.independent	4.least affected		
5.	A crystal can be an insulator only if the number of valence electrons in a primitive cell of the crystal is an integer.		CO4	K2
	1.odd	2.even		
	3.odd or even	4.whole		
6.	The magnitude of the energy gap for an insulator is		CO4	K1
	1.less than 1 eV	2.between 2 eV to 3 eV		
	3.more than 3 eV	4.between 1 eV to 2 eV		
7.	The lower the carrier concentration, is the magnitude of the Hall coefficient.		CO3	K2
	1.smaller	2.greater		
	3.very less	4.equal		
8.	Electrons in Fermi level will follow		CO3	K1
	1.Bose Einstein energy distribution	2.Maxwell Boltzmann energy distribution		
	3.Fermi Dirac energy distribution	4.Maxwell Planck energy distribution		

9.	Examine the following sentences carefully and choose the best answer from the following Assertion (A): Silicon devices can be used up to 1500 ° C. Reason (R): The energy band gap of Silicon is 1.1 eV.			K2	
	1.Both (A) and (R) are true and (R) is the correct explanation of (A).	a.Both (A) and (R) are true and (R) is not the correct explanation of (A).			
	3.(A) is true, but (R) is false	e.(A) is false, but (R) is true			
10.	An excess of donors will the electron concentration.		CO5	K1	
	1.decrease 2	Lincrease			
	3.does not affect 4	change			
Q. No.	SECTION - B (5 * 4 = 20 Marks) Answer ALL Questions		CO(s)	K - Level	
11. (a)	Give an outline on simple crystal structures with NaC	Cl structure as an example.	CO1	K2	
<i>a</i> >	[OR]		G0.1	***	
(b)	Predict the strength of alloys in relation to the disloca	itions in crystals.	CO1	K2	
12. (a)	Relate thermal conductivity to thermal resistivity.		CO2	K3	
(b)	[OR] Illustrate Debye model of density of states briefly.		CO2	K3	
13. (a)	Compare the electrical conductivity in solids with the	e help of Ohm's law.	CO3	K4	
	[OR]	•			
(b)	Derive and explain Wiedemann-Franz law.		CO3	K4	
14. (a)	Discuss the Fermi level in association with the semice	onductors and conductors.	CO4	K2	
(b)	[OR] Contrast the characteristic nature of valence band, forbidden band and conduction band in metals with a diagram.		CO4	K2	
15. (a)	Examine the effective masses in semiconductors.		CO5	K3	
[OR]					
(b)	Explain in brief on superlattices and its usage.		CO5	K3	
Q. No.	SECTION - C (3 * 10 = 3 Answer any of 3	,	CO(s)	K - Level	
16.	Discuss the concept of dislocations in crystals and che improve the crystal /alloy strength.	eck if it is an added advantage to	CO1	K2	
17.	Derive the expression of vibrations in a mono atomic lattice and give the location of first Brillouin zone.		CO2	K3	
18.	Interpret the thermal conductivity of Fermi gas and continuous thermal conductivity and electrical conductivity.	onfer the relation that exists between	CO3	K2	
19.	Correlate Schrodinger equation of periodic potential investigate the relation between them in detail.	with the Bloch function and	CO4	K4	
20.	Classify and explain electron orbits, hole orbits and o	pen orbits.	CO5	K3	
	******	**			