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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Sixth Semester, B.E. - Semester End Examination; July / Aug. - 2022
Condensed Matter Physics

Time: 3 hrs   Max. Marks: 100

Note: **I) PART - A** *is compulsory.* **Two** *marks for each question.*

   II) PART - B: *Answer any* **Two** *sub questions (from a, b, c) for a Maximum of* **18 marks** *from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Mention any two medical applications of x-ray.	2	L1	CO1	PO1
b.	State Wiedemann-Franz Law.	2	L1	CO1	PO1
c.	Define Entropy.	2	L1	CO1	PO1
d.	State Biot-Savart Law.	2	L1	CO1	PO1
e.	Define inertial and non-inertial frames.	2	L1	CO1	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	What are miller indies and derive an expression for interplaner spacing interns of miller indies.	9	L2	CO2	PO2
b.	Define Co-ordination number and atomic packing factor. Calculate the atomic packing factor for SC and FCC Structures.	9	L2	CO2	PO2
c.	Derive Bragg's equation and explain the construction and working of Bagg's Spectrometer.	9	L3	CO3	PO2
	UNIT - II	**18**			
2 a.	Derive an expression for thermal conductivity of a conductor using classical force electron theory.	9	L2	CO2	PO2
b.	Derive Wiedemann-Frenz law using classical free electron theory and calculate the Lorenty numbers.	9	L3	CO2	PO2
c.	i) Explain the principal and working of Refrigerator	6	L2	CO2	PO2
	ii) The temperature gradient in the earth crust in 32ºC per km and the mean conductivity of the rocks is 0.008 CGS units. Taking the radius of the earth as 6000 km, calculate the daily loss of heat by the earth.	3	L2	CO5	PO2
	UNIT - III	**18**			
3 a.	What is a Carnot engine? Derive an expression for efficiency of Carnot engine.	9	L3	CO3	PO2
b.	i) What is reversible and irreversible process?	4	L2	CO2	PO2
	ii) Calculate the efficiency of an engine having compression ratio13.8 and the expansion ratio 6 and working on diesel cycle.	5	L2	CO5	PO2
c.	Write a note on adiabatic expansion, adiabatic compression, isothermal expansion and isothermal compression.	9	L1	CO2	PO2

UNIT - IV		**18**	
4 a. i) Derive an expression for energy stored in a magnetic field.		6	L3 CO3 PO2
ii) Find the potential at appoint p(−1,2,3)m due to a point charge of -3 μC located at (−3, 1, 1) m.		3	L2 CO5 PO2
b. Define divergence of static magnetic fields, and derive an expression for it.		9	L3 CO2 PO2
c. Define electrostatic potential of dipole. Derive an expression for electrostatic potential due to dipole.		9	L3 CO2 PO2
UNIT - V		**18**	
5 a. Derive an expression for variation of mass with velocity and discuss the variation with reference to special theory of relativity.		9	L3 CO2 PO2
b. i) Derive an expression for Lorenty length contraction and discuss the variations with speed.		6	L3 CO2 PO2
ii) At what speed a clock be moved so that it may lose 1 minute in each hour?		3	L3 CO5 PO2
c. Derive an expression for Einstein's mass energy equivalence.		9	L3 CO2 PO2

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