Enrollment No:			Exam Seat No:				
			UNIVERSITY				
Summer Examination-2018							
Sı	Subject Name : Quantum Mechanics-II and Statistical Mechanics						
Sı	ıbject Code :	5SC02QMS1	Branch: M.Sc. (Physics)				
Se	emester : 2	Date: 02/05/2018	Time: 10:30 To 01:30	Marks: 70			
т.							
<u>In</u>	structions:	Programmable calculator an	d any other electronic instrument is p	prohibited			
	• •	<u> </u>	r book are strictly to be obeyed.	nomonea.			
	(3) Draw no	eat diagrams and figures (if	•				
	(4) Assume	suitable data if needed.					
		·-	CTION – I				
Q-1	Attem	pt the Following questions	8	(07)			
	•		nates used in understanding the	concept of			
	scatteri h . What is	=	to its unit) of differential scattering c	ross			
	section	· · · · · · · · · · · · · · · · · · ·	to its unity of unferential scattering e	1033			
	c. Give th	ne relation between differen	tial scattering cross section and scatte	ering			
	amplitu						
		•	lerstand the scattering problem. e propagator in the Born series?				
			presented by spherical waves?				
	-		nverting the Schrodinger equation into	o its			
	integra						
Q-2		pt all questions	ive the formule for the differential co	(14)			
		ection of such a scattering p	rive the formula for the differential sc process	cattering (07)			
		<u> </u>	derive the formula for the differentia	d (07)			
	scatteri	ing cross section of such a s	~ -				
			OR				
Q-2	Attem	pt all questions		(14)			
	_		e analysis by deriving the formula fo	or (12)			
		ntial scattering cross section		tial ways (02)			
		is the concept of phase shift ade and phase shift.	used? Give the relation between par	tial wave (02)			
Q-3	-	pt all questions		(14)			
	a. Determ	nine the integral form of wa	ve function and Schrodinger equation	n using (04)			



Helmholtz equation.

		b.	Explain the concept of Yukawa potential and determine the formula for scattering	(08)
		c.	cross section. Briefly explain the Born series.	(02)
		C.	OR	(02)
Q-3		a.	Starting with the Fourier transform of Green's function	(14)
			$(r) = \frac{1}{(2\pi)^{\frac{3}{2}}} \int e^{is.r} g(s)d^3s$, solve the integrals using Cauchy's integral formula	
			and derive the formula for Green's function for Helmholtz Equation.	
			SECTION – II	
Q-4			Attempt the Following questions:	(07)
		a.	State the Equipartition Theorem.	
		b. c.	Which type of magnetic materials is best explained using Ising model? State the De Haas Van Alphen Effect.	
		d.	Why Helium gas is preferred to understand the Bose Einstein Condensation?	
		e.	Name the two statistics that follow quantum mechanics.	
		f.	Name the two parameters which lead an ideal Bose gas towards Bose Einstein condensation.	
		g.	Define a Canonical Ensemble.	
Q-5			Attempt all questions	(14)
	a. b.		Derive the formula for the entropy of a perfect gas in a micro canonical ensemble. Derive the formula for Maxwell Boltzmann distribution of velocity for a	(07) (07)
	D.		canonical ensemble.	(07)
			OR	
Q-5	a.		Define a grand canonical ensemble and derive the complete normalized formula for the distribution function of such an ensemble.	(08)
	b.		State and prove the Virial theorem.	(06)
Q-6			Attempt all questions	(14)
	a.		Explain the Bose-Einstein condensation using an ideal Bose gas.	(12)
			Give the experimental proof of the same.	
	b.		State the postulates of the Density matrix.	(02)
			OR	
Q-6			Attempt all Questions	
	a.		Explain what you understand by an ideal Fermi gas. Highlight the properties exhibited by such gases.	(07)
	b.		Explain the concept of Ising model. How is the one dimensional Ising model	(07)
			different from the general form?	, ,

