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Ų.I.	Answer the follow	ing:	anima y ayaya	ing a salah sa Kanada salah s			
1	Due to effect of an	t dawn anar-		f angular momentum ope			
4.	is:	r down opera	ioi, eigenvalue o	r angular momentum ope	erator (Lz)		
	a. Decrease by ħ	h Incre	ease by ħ	n in the department of the contract of the con	e en la generation. L'Engage Designation		
	c. Remain same		ease by 11/2				
		۵, ۱۱۱۵۱۰	- with	Market State State			
2.	Due to distortion a	along y-axis; e	nergy of the state	E221 is decrease hv			
*	Due to distortion along y-axis, energy of the state E ₂₂₁ is decrease by: a. $-\frac{h^2}{ML^2}$ b. $-\frac{h^2}{ML^3}$ c. $-\frac{h^2}{4ML^2}$ d. $-\frac{h^2}{4ML^3}$						
	ML ²	ML^3	$C \frac{1}{4ML^2}$	$\Omega_{\bullet} = \frac{\Omega_{\bullet}}{4ML^3}$. Linnager Liv		
					and the second second		
2	TO SERVED THE SERVER STREET	Mark to the first	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	and the second s			
3.	The boundary cond	dition for the i	rotational motion	of particle are:			
3.	The boundary cond	dition for the ι b. 0 to π	rotational motion $c. \ 0 \ to \ 2\pi$	of particle are: d L/2 to + L/2	er Blandigelike Hymotologie L		
* .	The boundary conda. 0 to L	dition for the ι b. 0 to π	rotational motion c. 0 to 2π	of particle are; d L/2 to + L/2	er (1919-1955) Beginnin ter ome s Fin		
V	The boundary cond a. 0 to L The value of associ	dition for the n b. 0 to π iated Laguerre	rotational motion c. 0 to 2π	of particle are: d L/2 to + L/2 n =1 and l = 0 system is:			
V	The boundary conda. 0 to L	dition for the ι b. 0 to π	rotational motion c. 0 to 2π polynomials for c6	of particle are; d L/2 to + L/2 n = 1 and l = 0 system is; d 1	er ettergeter Herrichter Gerfelige Te errente er er		
V	The boundary cond a. 0 to L The value of associ a. 6 The expression for	dition for the π b. 0 to π iated Laguerre b. 1 the fourth ore	rotational motion c. 0 to 2π polynomials for c 6	of particle are: dL/2 to +L/2 n =1 and l = 0 system is: d1	en e		
4.	The boundary conda. 0 to L The value of associa. 6 The expression for a. $\langle \Psi^1 \hat{V} \Psi^2 \rangle$	dition for the r b. 0 to π lated Laguerre b. 1	rotational motion c. 0 to 2π polynomials for c 6 der perturbation	of particle are; d L/2 to + L/2 n = 1 and l = 0 system is; d 1 energy is:	or an agency of the large of th		
4.	The boundary conda. 0 to L The value of associa. 6 The expression for a. $\langle \Psi^1 \hat{V} \Psi^2 \rangle$	dition for the r b. 0 to π lated Laguerre b. 1 the fourth ore	rotational motion c. 0 to 2π polynomials for c 6 der perturbation	of particle are: d L/2 to + L/2 n = 1 and l = 0 system is: d 1 energy is:	Harrist Services		
4.	The boundary conda. 0 to L The value of associa. 6 The expression for a. $<\Psi^1 \hat{V} \Psi^2>$ b. $<\Psi^2 \hat{V} \Psi^2>$ c. $<\Psi^0 \hat{V} \Psi^3>$	dition for the r b. 0 to π lated Laguerre b. 1 the fourth ore	rotational motion c. 0 to 2π polynomials for c 6 der perturbation	of particle are: d L/2 to + L/2 n = 1 and l = 0 system is: d 1 energy is:	Harrist Services		
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4. 5.	The boundary conda. 0 to L The value of associa. 6 The expression for a. $< \Psi^1 \mathring{V} \Psi^2 >$ b. $< \Psi^2 \mathring{V} \Psi^2 >$ c. $< \Psi^0 \mathring{V} \Psi^4 >$ The value of ionizatis: a2.75 a.u. b4.00 a.u. c. 2.00 a.u.	dition for the π b. 0 to π iated Laguerre b. 1 the fourth ord tion energy of	rotational motion c. 0 to 2π polynomials for c 6 der perturbation helium atom in p	of particle are: d L/2 to + L/2 n = 1 and l = 0 system is: d 1 energy is:	Howard Comments of the Comment of th		
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4.5.6.	The boundary conda. 0 to L The value of associa. 6 The expression for a. $< \Psi^1 \mathring{V} \Psi^2 >$ b. $< \Psi^2 \mathring{V} \Psi^2 >$ c. $< \Psi^0 \mathring{V} \Psi^4 >$ The value of ionizatis: a2.75 a.u. b4.00 a.u. c. 2.00 a.u. d. 0.75 a.u	dition for the r b. 0 to π iated Laguerre b. 1 the fourth ore	rotational motion c. 0 to 2π polynomials for c 6 der perturbation helium atom in p	of particle are: d L/2 to + L/2 n = 1 and l = 0 system is: energy is: coresence of repulsion energy	a deposit a depo		
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4.5.6.	The boundary conda. 0 to L The value of associa. 6 The expression for a. $< \Psi^1 \mathring{V} \Psi^2 >$ b. $< \Psi^2 \mathring{V} \Psi^2 >$ c. $< \Psi^0 \mathring{V} \Psi^4 >$ The value of ionizatis: a2.75 a.u. b4.00 a.u. c. 2.00 a.u. d. 0.75 a.u Which of the follow a. HAB	dition for the r b. 0 to π iated Laguerre b. 1 the fourth ore	rotational motion c. 0 to 2π polynomials for c 6 der perturbation helium atom in p	of particle are: d L/2 to + L/2 n = 1 and l = 0 system is: d 1 energy is: coresence of repulsion energy is: coresence of repulsion energy is:	en en egen e		
4.5.6.	The boundary conda. 0 to L The value of associa. 6 The expression for a. $< \Psi^1 \mathring{V} \Psi^2 >$ b. $< \Psi^2 \mathring{V} \Psi^2 >$ c. $< \Psi^0 \mathring{V} \Psi^4 >$ The value of ionizatis: a2.75 a.u. b4.00 a.u. c. 2.00 a.u. d. 0.75 a.u Which of the follow	dition for the r b. 0 to π iated Laguerre b. 1 the fourth ore	rotational motion c. 0 to 2π polynomials for c 6 der perturbation helium atom in p	of particle are: d L/2 to + L/2 n = 1 and l = 0 system is: d 1 energy is: oresence of repulsion energy is: rlap integral?	en en egen e		

	The value of spin multiplici	ty for Est molecule is:			
8.		ty for 12 moreonic is:	e construir s		
	a. Four		** * * * * * * * * * * * * * * * * * * *		
	b. One		High state of the		
	c. Two	\$10 at 1			-
	d. Three	minus no filipad	sueste est.		
Q.2.	Attempt any <u>SEVEN</u> of the	following:	ra 1960 - ra Mereda gre		14
1.	What are the application of	quantum mechanical	tunneling?		
2.	Evaluate the commutator				
	Explain the total wave fund	ation for hydrogen like	e atom.	3.47	The second second
3. 4.	Derive the kinetic energy	of harmonic oscillator	•	-	•
	Derive the first order pertu	rhation energy equati	on.	***	: -
5. 6.	Calculate the total energy	of helium atom in = 0.435 x10 ⁻¹⁷ Js. and	presence and a 1j = 6.24 X 10 ¹	°ev)	ion
7.	Evaluin the handing in LiH	on the basis of valent	ce bond treatmo	ent.	
8.	The π _u 2Px orbital is higher	in energy than $\sigma_g 2Pz$	for the F2 syste	m. Explain.	
9.	Explain the eigenvalue equ	uation.	. •		
Q.3.A.	Show that square of angu	llar momentum oper	t operator (L+).	Mulie combonem	. 01
-	angular momentum oper	ator (Lx) does not co	ommute with co	omponent of angu	ular
	momentum operator (Ly)	and ladder operator	(L₊).		refer a
7				c II	ters 6
В.	Explain the utility of part	icle in box model and	d calculate the	following parame	leis o
	for the butadiene molecu	le:			
	1. Lowest absorption free	luency in cm ⁻² .		•	
	2. Wave length of light at	sorbed in nm.	e 4.	e i i i i en en en este i	
·	3. Total ground state ene	rgy in cm ⁻¹ .		0.06 V 103 cm-1	The
	[Given: h=6.626 X 10 ⁻³⁴	$J_{S.}, 1J = 6.24 \times 10^{10}$	evano lev=	o.00 A 10 Cill	C-C
	length of the butadiene	is equal to the leng	tn of carbon cr	A v 10-7 cm-11	
	bond length on either sid	le and average C-C bo	ind length is our	4 X 10 Cit 1	
	OR		12.45		4" 1
В	. Answer the following:				
1	. Derive the equations for	Hamiltonian and ang	ular momentun	n operators.	
2	Derive the wave function	n and energy equation	on for a translat	ional motion of a	free
	particle.	<u> </u>	•		
Q.4.A	Anguar the following:				6
· ·	Derive the value of nor	malization factor (N)	of the radial eig	anfunction for	
-	n = 1, l = 0 and $n = 3, l = 0$	1 systems.			
;	2. Derive the third degree	e of Hermite's polyno	mial.		
		•			³ 3

В.	Answer the following:	6		
1.	Derive the Schrödinger equation for the vibrational motion of a particle in a one dimensional harmonic oscillator.			
2.	Derive the normalization factor and the characteristic of eiganfunction of a one dimensional harmonic oscillator.			
	<u>OR</u>			
B. 1. 2.	Answer the following: Derive the recursion formula for the Hermite's differential equation. Explain the rotational motion of particle on a sphere.			
Q.5.A.	Explain the Dirac notation and discuss the time independent perturbation theory for non-degenerate case.			
В.	Explain the spin-orbit interaction Derive the term symbols arising out of the coupling between an electron in d-orbital and an electron in f-orbital.	6		
	<u>OR</u>			
В.	Answer the following:			
1. 2.	Discuss the Hatree-self consistent field methods. Derive the equation for the first order correction to wave function.			
Q.6.A.	Discuss the Born- Oppenheimer approximation for the solution of Schrödinger equation.			
В	Explain the MO theory of bonding for hydrogen molecule.	6		
	<u>OR</u>			
В.	Answer the following:			
1	 Explain the electronic state and term symbols for diatomic molecule. Determine the term symbols for the Be₂, N₂⁺ and O₂⁺ molecules. 			
2	and the second s			
