Assignment 7

The data for submitting this assignment has passed.

Due on 2023-03-10, 20:59 IST.

As per our records you have not submitted this assignment.

1. Hamiltonian operator \( \hat{H} \) is a symmetry operator:
   1 point
   - equivalent to
   - commutes with
   - in terms of
   - none of these
   
   1.5 points
   
   The answer is incorrect. Answer:

   2. \( \Sigma_{v} \) is a space group. \( \Sigma_{v} \) and \( \Sigma_{v}^{\prime} \) orbitals of a hydrogen atom of \( \Sigma_{v} \) molecule can be represented by \( \psi_{1} = \Psi_{A} \) and \( \psi_{2} = \Psi_{B} \). What is the result of applying \( \Sigma_{v} \) operation on \( \psi_{1} \)?
   1 point
   
   Correct operators are:
   - commutes with
   - in terms of
   - none of these
   
   1.5 points
   
   The answer is incorrect. Answer:

   3. For a set of degenerate eigenfunctions, which one of the following is true:
   1 point
   
   - \( \langle \Phi_{1} | \hat{H} | \Phi_{2} \rangle \)
   - \( \langle \Phi_{1} | \hat{H}^{2} | \Phi_{2} \rangle \)
   - \( \langle \Phi_{1} | \hat{H} | \Phi_{2} \rangle \)
   - \( \langle \Phi_{1} | \hat{H} | \Phi_{2} \rangle = 0 \)
   
   1.5 points
   
   The answer is incorrect. Answer:

   4. Suppose two eigenfunctions form basis of representation in a point group, then the ________ of the two basis sets will also form a basis of that point representation in the point group:
   1 point
   
   - Product
   - Direct Product
   - Symmetry
   - All of these
   
   1.5 points
   
   The answer is incorrect. Answer:

   5. The ________ of the representation of \( \psi_{1} \) are equal to the product of the characters of the representations based on individual set of functions:
   1 point
   
   - Characters, Direct Product
   - Characters, Summation
   - Characters, Product
   - All of these
   
   1.5 points
   
   The answer is incorrect. Answer:

   6. ________ of two matrices is equal to ________ of the two matrices:
   1 point
   
   - Trans, Product
   - Trans, Direct Product
   - Trans, Product, Trans, Product
   - All of these
   
   1.5 points
   
   The answer is incorrect. Answer:

   7. In a direct product of an \( \rho \) ________ representation with itself, the ________ representation ________
   1 point
   
   - Total symmetry, degenerate, occurs once and only once
   - Irreducible, totally symmetric, occurs once and only once
   - Doubly degenerate, totally symmetric, occurs once and only once
   - All of these
   
   1.5 points
   
   The answer is incorrect. Answer:

   8. In a direct product of two different \( \sigma \) ________ representation ________
   1 point
   
   - Total symmetry, degenerate, occurs once and only once
   - Irreducible, totally symmetric, occurs once and only once
   - Double degenerate, totally symmetric, occurs once and only once
   - All of these
   
   1.5 points
   
   The answer is incorrect. Answer:

   9. Calculate the direct product of \( \sigma \) ________ and \( \rho \) ________ in the following character tables:
   2 points
   
   - \( A_{1} \) 1 1 1 1 1
   - \( E \) 2 -1 0 0 0
   - \( B_{2} \) -1 1 0 0 0
   - \( B_{2} \) 1 1 1 1 1
   - \( E \) 2 -1 0 0 0

   1.5 points
   
   The answer is incorrect. Answer:

   10. \( A_{1} \), \( B_{2} \), \( E \)

   1.5 points
   
   The answer is incorrect. Answer:

   11. ________ of the following direct products (from above character table), product which one will have if one of the components upon reduction:
   1 point
   
   - You may use reduction formulas, but it is not required.
   - All of these
   
   1.5 points
   
   The answer is incorrect. Answer:

   Accepted Answers:
   - All of these