

22. (a) What is meant by central field approximation?

Or

(b) Explain briefly Hartree-Fock equation.

23. (a) Discuss briefly spin-orbit interaction as a correction to central field approximation.

Or

(b) Explain hybridisation with an example.

24. (a) What are Einstein's coefficients?

Or

(b) Write a note on density matrix.

25. (a) What is meant by quantisation of wave fields?

Or

(b) Derive the quantum equation of the field.

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SECTION C — (5 × 10 = 50 marks)

Answer ALL questions, choosing either (a) or (b).

26. (a) Give the theory of Born approximation and discuss the conditions for the validity of Born approximation.

Or

(b) Describe fully the method of partial waves for scattering.

27. (a) Discuss fully Thomas-Fermi statistical model to determine the potential energy in the central field approximation.

Or

(b) Obtain the central field approximation using Hartree's self-consistent field method. Compare this method with Thomas-Fermi statistical model.

28. (a) Explain in detail Heitler-London theory to obtain the energy values of the hydrogen molecule.

Or

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