

Match the following :

- |                                 |                     |
|---------------------------------|---------------------|
| 11. Neutron proton scattering   | (a) LCAO            |
| 12. Central field approximation | (b) Einstein        |
| 13. Hydrogen molecule ion       | (c) Schrodinger     |
| 14. Transition probability      | (d) Self consistent |
| 15. Quantisation of field       | (e) Reduced mass.   |

Answer in one or two sentences :

16. What is the scattering cross-section value in the case of neutron-proton scattered, calculated by theory?
17. What is the value of total spin in the case of hydrogen molecule for stable and unstable state?
18. Give examples for alkali atom.
19. Give an example for the type of emission strongly frequency dependent.
20. What is the value of  $[\hat{c}_i, \hat{N}_j]$ ?

## SECTION B — (5 × 6 = 30 marks)

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

21. (a) Define scattering amplitude and explain.

Or

- (b) Outline the properties of coulomb scattering.

22. (a) Write down schrodinger equation for an N-electron system and explain the important terms.

Or

- (b) What are the main assumptions of central field approximation? Explain.

23. (a) Write a note on co-variant bond.

Or

- (b) Explain the term 'hybridisation'.

24. (a) Explain the two kinds of emission. Derive Einstein coefficients.

Or

- (b) Outline the properties of density matrix.