Assignment 3l quantum information theory).

Question 1

' A hydrogen atom is kept in an isolated state.
Write its state in the product basis of its nucleus and electron.

B Write the density matrix of the state of the atom

C Write the reduced density matrix of the electronic state

D . calculate the entanglement entropy of the atom

E. Is the atom in a pure state or mix ed state?

F. For what conditions atomic state is separable.

Question 2 _

.
- consider two electrons in a square box
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- A.. Write the state of the system

B. White the Von Neumann entropy of the state

C. Write the entanglement entropy of the state '

Question 3

consider a composite system consisting of too subsystems A and B.
Is the density matrix of subsystem A same or different from
The reduced density matrix of A.? Explain .your answer.

Question 4

Two electrons are moving in an electric field, changing randomly from.
one space point to the other. Describe the state of the system and
calculate the Von neumann entropy of the two election system.

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Question 5

An atom with one electron in its outermost shell is placed in an external radiation field.
.' take. Atom as a hydrogen atom. And describe its state.