Unit 11 - Week 9 - Various Aspects of Qubits in Action

Assignment-9

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-10-02, 23:59 IST.

1) The commercial quantum computers from the D-wave are based on *1 point*

- maximizing approach using annealing simulation
- a novel type of superconducting processor that uses quantum mechanics to massively accelerate computation
- 2000 bits kept at a temperature that is colder than interstellar temperature
- tunneling across Silicon junction nodes

No, the answer is incorrect.
Score: 0
Accepted Answers:
a novel type of superconducting processor that uses quantum mechanics to massively accelerate computation

2) The basic principle(s) behind the D-wave quantum computing is(are) *1 point*

- The lowest energy state as the system cools down
- Quantum annealing approach of minimization
- Quantum tunneling and entanglement
- All the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
All the above

3) Reliable quantum operation of the core processor of the D-wave machines is only possible, if it is kept *1 point*

- at interstellar space temperature so that it can be isolated
- 5.8 x 10^3 K that is about the temperature of the surface of sun
- liquid nitrogen temperature
- isolated from surrounding and at 15 mK so that it can behave quantum mechanically

No, the answer is incorrect.
Score: 0
Accepted Answers:
isolated from surrounding and at 15 mK so that it can behave quantum mechanically

4) The surprisingly low power requirement of D-wave quantum computers is due to the fact: *1 point*

- Low temperature operation dissipates less heat and so lesser power requirement
- Additional liquid nitrogen provides for removing heat and lesser heat load
- The use of superconducting electronics
- Solid state architecture does not require much power usage

No, the answer is incorrect.
Score: 0
Accepted Answers:
The use of superconducting electronics

5) The user interface for the D-wave computing system is through interfacing and programming by: *1 point*

- using client libraries available for C, C++, Python and MATLAB
- a laser pointer that acts as program interface
- through proprietary electrical signaling pathways developed by Coherent Inc
- through Android operating system

No, the answer is incorrect.
Score: 0
Accepted Answers:
using client libraries available for C, C++, Python and MATLAB

6) The qubit for the D-wave computing is: *1 point*

- the thin films of Niobium metal that act as free electrons at very low operating temperatures
- the thin films of Niobium metal that act as superconducting loops with resistance free current circulating back & forth
- the tiny loops of Niobium metal that act as superconducting loops with resistance free current circulating back and forth
- the tiny loops of Niobium metal that is used in place of copper wiring to result in magnetic qubits

No, the answer is incorrect.
Score: 0
Accepted Answers:
the tiny loops of Niobium metal that act as superconducting loops with resistance free current circulating back and forth

7) The commercially viable qubits that are being pursued most popularly are *1 point*

- Semiconducting loops, Quantum cascade laser, Electron Spin Resonance and Josephson-junction
- Ion traps, semiconducting loops, Silicon quantum dots, diamond vacancies and topological qubits
- Atom traps, Josephson-junction, laser oscillator and cavity QED
- NMR, cavity QED, ion traps and semiconducting loops

No, the answer is incorrect.
Score: 0
Accepted Answers:
Ion traps, semiconducting loops, Silicon quantum dots, diamond vacancies and topological qubits

8) Spintronics materials play an important role in many modern approaches to quantum computing as such techniques rely on *1 point*

- the ease of making such material, which also do not require high vacuum conditions
- superconductivity and spintronic materials are typically superconducting in nature and dissipate less heat
- the high difficulty level of the problem and thus would be a nice problem to pursue for years to come as is also very attractive to scientists who love to publish papers
- spin and electron charge manipulation that can be achieved in spintronic materials

No, the answer is incorrect.
Score: 0
Accepted Answers:
spin and electron charge manipulation that can be achieved in spintronic materials

9) Spintronics approach is different from NMR approach though both use spin states for qubits. Which is the most relevant difference between the two for quantum computing? *1 point*

- NMR requires very large magnetic fields and liquid samples unlike spintronics
- NMR deals with the nuclear spin while spintronics deals with the electron spin
- spintronics is a combination of charge and electronic spin manipulation unlike NMR
- NMR is an old approach and spintronics is new but is based on the same principle

No, the answer is incorrect.
Score: 0
Accepted Answers:
NMR deals with the nuclear spin while spintronics deals with the electron spin

10) Addressability with 'spin' as against only 'charge' of the fundamental particle is spintronics and the development of spintronics is often attributed to the discovery of Giant magnetoresistance (GMR). Quantum computing benefits from using GMR *1 point*

- which cannot be defended as GMR is a completely classical concept
- as it is the basis of solid-state microscale data storage
- as it amplifies the relative spin interactions and helps in addressability with relative opposing current flow that give drastic changes in GMR
- as it is easy to couple to laser, which can lead to superposition of the two

No, the answer is incorrect.
Score: 0
Accepted Answers:
as it amplifies the relative spin interactions and helps in addressability with relative opposing current flow that give drastic changes in GMR