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SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2023

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U PHY6 B12 / CC20U PHY6 B12 - NUCLEAR PHYSICS AND PARTICLE PHYSICS

(Physics - Core Course)

(2019, 2020 Admissions)

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Time : 2.00 Hours   Maximum : 60 Marks

Credit : 3

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Part A (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

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1. What are isotopes?

2. Give Semiempirical binding-energy formula and value of constants in it.

3. What is gamma decay process?

4. Give the relationship between reaction cross section and the rate of emission of outgoing particle in a nuclear reaction.

5. Write down expression for Q-value of a nuclear reaction and explain the symbols.

6. Differentiate between nuclear fission and fusion reactions.

7. Give any three uses of neutron activation analysis.

8. What is Cerenkov radiation?

9. What is the difference between linear accelerator and a cyclotron?

10. Do all strongly interacting particles also feel weak interaction?

11. In particle interaction and decays the beam particle and target particle are protons. Why?

12. What are messenger or field particles?

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(Ceiling: 20 Marks)

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Part B (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

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13. Explain the properties of nuclear forces.

14. ^{40}K is an unusual isotope, in that it decays by negative beta emission, positive beta emission, and electron cap- ture. Find the Q values for these decays.

15. Explain the process of electric power generation using nuclear fission process.

16. Explain the principle and working of a Cloud chamber.

17. Explain the principle and working of Scintillation counters.

18. Explain the principle of betatron.

19. Explain the principle of alternating gradient synchrotron.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any *one* question. The question carries 10 marks.

20. Explain nuclear properties such as constituents, mass, size, shape, density, binding energy, nuclear forces, etc.

21. Give an account of various conservation laws in particle reactions of elementary particles.

(1 × 10 = 10 Marks)

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