23U609 (Pages: 2) Name: .....

Reg.No: .....

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2026

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19UPHY6B12 / CC20UPHY6B12 - NUCLEAR PHYSICS AND PARTICLE PHYSICS

(Physics - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

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

1. Distinguish between isotopes and isobars.
2. Write down equations for 'Q value' calculation in different beta decay processes.
3. What is meant by Q-value of a reaction?
4. What is a nuclear radiation detector?
5. What is Cerenkov radiation?
6. What are the limitations of linear accelerators?
7. What is a betatron?
8. Give the names of three accelerators still in use.
9. Name the four basic forces in nature.
10. Classify the elementary particles on the basis of mass.
11. What is meant by threshold energy in high energy particle reactions?
12. What is meant by efficiency of a nuclear particle reaction?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Using semiempirical binding energy formula calculate binding energy of ^{64}Zn.
14. Explain the properties of nuclear forces.
15. Explain radio carbon dating process for calculating age of fossils.

16. Thirty milligrams of gold are exposed to a neutron flux of 3.0×10^{12} neutrons/cm^2/s for 1.0 min. The neutron capture cross section of gold is 99 b. Find the resultant activity of ^{198}Au.

17. Explain nuclear fusion process. How it can be used for electric power generation?

18. Explain the principle and working of proportional counter.

19. Conclude the gellmann attributes of quarks.

(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. Explain the construction and working of a nuclear fission reactor.

(1 × 10 = 10 Marks)

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