22U609 (Pages: 2) Name : .....

Reg. No : .....

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2025

(CBCSS-UG)

(Regular/Supplementary/Improvement)

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

(Physics - Core Course)

(2019 Admission onwards)

Time: 2 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. What is meant by binding energy of a nucleus ?
3. Write any two properties of liquid drop model.
4. Write any properties of nuclear force.
5. What is the function of moderators in nuclear reactors?
6. What is Cerenkov radiation?
7. What are accelerators? What is their uses?
8. Give the names of three accelerators still in use?
9. What are mesons? Name three of them.
10. Give an example for the formation of resonance particle.
11. In high energy particle physics,lab frame or CM frame which is more efficient to conduct experiments?
12. What is standard model?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Explain different beta decay processes in detail.
14. In nuclear reaction experiments, we usually measure two basic properties of the emitted particle y; its energy and its probability to emerge at a certain angle with a certain energy. What useful information can we obtain from it? Explain.
15. Compute the Q value for the reaction $^{2}H + ^{63}Cu \rightarrow n + ^{64}Zn$ in SI unit (Joule).

16. How nuclear physics is used for diagnostic and therapeutic purposes in medical field?

17. Explain the principle and working of Scintillation counters.

18. A cyclotron is connectec to the oscillator of frequency 15mhz. What should be the operating magnetic field for accelerating protons. the radius of dees is 60cm. Calculate the maximum kinetic energy of proton in ev, the mass of the proton = 1.67×10^{-27}kg.

19. Write a brief note on any three families of particles. What is lepton number conservation? Give examples.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. How fission and fusion reactions can be used to generate electrical power?

21. Explain the principle, construction and working of Cloud chamber and bubble chamber.

(1 × 10 = 10 Marks)

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