

19U608

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Name: .....

Reg.No: .....

**SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2022**

(CBCSS - UG)

**CC19U PHY6 B12 - NUCLEAR PHYSICS AND PARTICLE PHYSICS**

(Physics - Core Course)

(2019 Admission - Regular)

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 mass number and atomic number.
2. Distinguish between decay constant and activity in nuclear decay.
3. What is an alpha decay?
4. What is a nuclear reaction? Give an example.
5. How do we produce radio isotopes through nuclear reactions ?
6. What is induced nuclear fission?
7. Differentiate between nuclear fission and fusion reactions.
8. What is a bubble chamber?
9. What is cyclotron frequency?
10. What are mesons? Name three of them.
11. What are resonance particles?
12. What is electroweak theory?

**(Ceiling: 20 Marks)**

**Part B** (Short essay questions - Paragraph)

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

13. Explain nuclear binding energies.
14.  $^{12}\text{N}$  beta decays to an excited state of  $^{12}\text{C}$ , which subsequently decays to the ground state with the emission of a 4.43 MeV gamma ray. What is the maximum kinetic energy of the emitted beta particle?

15. What are the applications of medical radiation physics?
16. Explain the principle and working of Scintillation counters.
17. Explain the principle and working of semiconductor counter.
18. Explain the working of Van de graaff generator with neat diagram.
19. What radius is needed in proton synchrotron to attain particle energies of 10Gev. Assume that magnetic field available is 1.5T.

**(Ceiling: 30 Marks)**

**Part C (Essay questions)**

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

20. Obtain an expression for calculating binding energy of a nucleus of atomic number  $Z$  and mass number  $A$  based on liquid drop model.
21. Give a detailed explanation for families of particles.

**(1 × 10 = 10 Marks)**

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