



**Avinashilingam Institute for Home Science and Higher Education for Women**  
(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)  
Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B  
Coimbatore - 641 043, Tamil Nadu, India

**Bachelor's Degree Examination – August 2020**  
**VI Semester**

**Class : III UG**  
**Major : Physics**

**Time : 2 Hours**  
**Max. Marks : 50**

**15BPHC22 Nuclear and Particle Physics**

**Part A**  
**Choose the Correct Answer**

**10 x 1 = 10**

- Isotopes have same
  - mass number
  - atomic number
  - neutron number
  - proton and neutron number
- Magic numbers are
  - 2, 20, 85, 126, 735
  - 1, 5, 10, 35, 125
  - 2, 8, 20, 50, 82, 126
  - 1, 4, 8, 12, 28
- For detecting gamma rays using an ionisation chamber, chamber walls are made of
  - aluminium
  - graphite
  - magnesium
  - platinum
- To accelerate electrons, the device used is
  - cyclotron
  - synchrocyclotron
  - betatron
  - cosmotron
- Plateau region of GM counter corresponds to
  - count rate independent of potential difference across the tube
  - voltage is dependent on temperature
  - temperature is inversely proportional to voltage
  - variation of mass with velocity
- Geiger Nuttal law relates
  - range of alpha particle and disintegration constant
  - time of operation and output value
  - range and time
  - time and frequency of operation
- Age of Earth is estimated from the relative abundance of
  - uranium
  - thorium
  - actinium
  - cadmium
- Who demonstrated the first artificial transmutation experiment?
  - Rutherford
  - J.J. Thomson
  - Chadwick
  - Einstein
- Cosmic rays consists of charged particles having an energy of the order of
  - 5 eV
  - 50 eV
  - 15 GeV
  - 16 MeV
- Antiparticle of electron is
  - positron
  - meson
  - sigma
  - omega

**Part B****3 x 6 = 18**Answer any **Three** questions**Each answer should not exceed 400 words or two pages**

11. Discuss about the classification of nuclei.
12. List the properties of nuclear forces.
13. Explain the working of GM counter.
14. Discuss about the working of linear accelerator.
15. Compare half-life and mean life.
16. How can we calculate age of Earth?
17. List the applications of radio isotopes.
18. Explain nuclear fusion with suitable examples.
19. Explain latitude and altitude effect of cosmic rays.
20. Elaborate about four kinds of interaction between elementary particles.

**Part C****2 x 11 = 22**Answer any **Two** questions**Each answer should not exceed 800 words or four pages**

21. Give the meson's theory of nuclear forces.
22. Compare and contrast liquid drop with the nucleus and explain shell model.
23. Describe the construction and working of Wilson's cloud chamber.
24. Describe the theory and the working of a betatron.
25. Give an account of experiment to determine the range and energy of alpha particle accurately.
26. Explain in detail about:
  - i. Law of successive disintegration
  - ii. Soddy Fajans law.
27. Discuss about:
  - i. Energy balance in nuclear reaction and Q value
  - ii. Threshold energy of endo-ergic reaction.
28. Explain about uncontrolled nuclear reaction.
29. Write short notes on:
  - i. Van Allen belts
  - ii. Origin of cosmic rays.
30. Give in detail about the classification of elementary particles.

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