

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2022  
(Sixth Semester)

Branch – PHYSICS

NUCLEAR PHYSICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 x 1 = 10)

- Which of the following is a stable nucleus?  
(i) The nucleus with even protons and odd electrons  
(ii) The nucleus with even number of protons and neutrons  
(iii) The nucleus with even neutrons and odd protons  
(iv) The nucleus with odd protons and neutrons
- Choose the energy equivalent of mass defect is called \_\_\_\_\_ energy.  
(i) atomic (ii) binding  
(iii) mass (iv) nuclear
- Find in neutral atom, the electrons are bound to the nucleus by \_\_\_\_\_.  
(i) Magnetic force (ii) Electromagnetic force  
(iii) Friction force (iv) Centripetal force
- The number of protons or atomic number is reduced to 2 by which form of radioactive decay  
(i) Beta-decay (ii) Gamma decay  
(iii) Alpha decay (iv) None of the above
- The angular frequency of a cyclotron is independent of \_\_\_\_\_.  
(i) Speed (ii) Mass  
(iii) Magnetic field (iv) Charge
- The particles that are accelerated to high energies in betatron are \_\_\_\_\_.  
(i) neutrons (ii) electrons  
(iii)  $\alpha$ -particles (iv) elementary particles
- Which of the following is used as a moderator in a nuclear reactor?  
(i) Cadmium (ii) Plutonium  
(iii) Uranium (iv) Heavy water
- Identify the Nuclear fission can be explained by \_\_\_\_\_.  
(i) shell model (ii) Bohr atom model  
(iii) quark model (iv) liquid drop model
- State True or False:  
Leptons and quarks are called the survivors.  
(i) True (ii) False
- Name the Fundamental Particles Which Help Create Strong Force Between Quarks?  
(i) Leptons (ii) Quarks  
(iii) Photons (iv) Gluons

Cont...

**SECTION - B (35 Marks)**

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 7 = 35)

- 11 a Explain in detail about the liquid drop model.  
OR  
b Compare and contrast electron and proton.
- 12 a Enumerate the properties of alpha rays.  
OR  
b Outline the phenomenon of artificial radioactivity.
- 13 a Compare GM counter with scintillation counter.  
OR  
b How does a linear resonance accelerator work? Explain with diagram.
- 14 a Explain briefly about controlled fusion.  
OR  
b Bring out the condition for sustained chain reaction.
- 15 a Narrate the origin of cosmic rays.  
OR  
b Differentiate between latitude effect and altitude effect.

**SECTION - C (30 Marks)**

Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30)

- 16 Discuss the theories of nuclear composition.
- 17 How the Beta Ray energies can be measured? Explain.
- 18 Analyze the working of betatron with a neat diagram.
- 19 Elucidate the principle, construction theory and uses of nuclear reactor.
- 20 Classify the elementary particles in detail.

Z-Z-Z

END