647510 **BSc5PhyC502x** **Seat No :_____**

B.Sc. Semester - 5 (*CBCS*) Examination
Oct/Nov - 2021 (NEW COURSE)
Nuclear& Particle Physics(Core)

Time: 2:30 Hours **Marks: 70**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1(A) **Answer the following questions. (Any Two Out of Three)** (10)

1. Discuss Semi-Empirical mass formula and significance of various terms.
2. Write a note on evidences of shell model.
3. Discuss various intrinsic properties of nucleus.

Q.1(B) **Answer the following questions. (Any One Out of Two)** (04)

1. Explain Rutherford's α-scattering experiment.
2. For an Oxygen isotope ($_8O^{16}$) having nuclear mass 15.990523 amu, calculate the binding energy per nucleon in MeV. Mass of proton = 1.007276 and mass of neutron = 1.008665 amu.

Q.2(A) **Answer the following questions. (Any Two Out of Three)** (10)

1. Discuss law of radioactive decay.
2. Discuss continuous beta ray spectrum.
3. Discuss the properties of alpha particle.

Q.2(B) **Answer the following questions. (Any One Out of Two)** (04)

1. Write a note on nuclear isomerism.
2. The half-life of Radon is 3.80 days. After how many days only twentieth of a Radon sample remain behind?

Q.3(A) **Answer the following questions. (Any Two Out of Three)** (10)

1. Discuss Threshold energy of endoergic reaction.
2. Define any five types of Nuclear reactions.
3. How does radiation interact with matter?

Q.3(B) **Answer the following questions. (Any One Out of Two)** (04)

1. Discuss the principle of Scintillation counter.
2. Write a note on Ionization chamber.

Q.4(A) **Answer the following questions. (Any Two Out of Three)** (10)

1. Discuss construction and working of Cyclotron and derive equation for cyclotron frequency.
2. Write a note on main components of Nuclear reactors.
3. Discuss construction and working of synchrocyclotron.

Q.4(B) **Answer the following questions. (Any One Out of Two)** (04)

1. Write a note on Bohr & Wheeler's theory of nuclear fission.
2. Write a note chain reaction.

Q.5(A) **Answer the following questions. (Any Two Out of Three)** (10)

1. Write a note on Proton-Proton cycle and Carbon-Nitrogen cycle.
2. Discuss any five elementary particle quantum number.
3. Write a note on particles and antiparticles.

Q.5(B) **Answer the following questions. (Any One Out of Two)** (04)

1. Can the following reaction occur?

$$p + p \longrightarrow n + p + \pi^{+}$$

2. Discuss the properties of three generation of quarks and leptons.

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