

B.Sc. Semester - 5 (Remedial) (CBCS) Examination**March/April-2024 (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.

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- Que-1(A) Answer the following questions (any two out of three) (10)
- (1) Discuss Semi-Empirical mass formula and significance of various terms.
 - (2) Discuss Nuclear Stability.
 - (3) Write a note on Liquid Drop Model.
- Que-1(B) Answer the following questions (any one out of two) (04)
- (1) Describe the classification of nuclei.
 - (2) Calculate the binding energy per nucleon of ${}_{28}\text{Ni}^{64}$. Mass of proton = 1.007275 amu, mass of neutron = 1.008665 amu, mass of ${}_{28}\text{Ni}^{64}$ nucleus = 63.8126 amu.
- Que-2(A) Answer the following questions (any two out of three) (10)
- (1) Explain theory of beta decay and neutrino hypothesis.
 - (2) Explain the applications of radio isotopes.
 - (3) Explain gamma decay and gamma ray emission.
- Que-2(B) Answer the following questions (any one out of two) (04)
- (1) The half-life of radon is 3.80 days. After how many days only twentieth of a radon sample remain behind?
 - (2) Discuss classical forbidden region in α – decay.
- Que-3(A) Answer the following questions (any two out of three) (10)
- (1) Explain conservation laws in nuclear reactions.
 - (2) Explain principle and working of G.M. counter.
 - (3) Derive the Q value equation.
- Que-3(B) Answer the following questions (any one out of two) (04)
- (1) Obtain equation of threshold equation.
 - (2) Explain Photomultiplier.
- Que-4(A) Answer the following questions (any two out of three) (10)
- (1) Describe cyclotron frequency and energy of an ion.
 - (2) Discuss the main components of nuclear reactor.
 - (3) Derive betatron condition.
- Que-4(B) Answer the following questions (any one out of two) (04)
- (1) Write a note on Atom bomb.
 - (2) Explain critical size in nuclear reactor.
- Que-5(A) Answer the following questions (any two out of three) (10)
- (1) Explain fusion reactors and conditions for reactions.
 - (2) Discuss the classification of elementary particles.
 - (3) Discuss particles and antiparticles.
- Que-5(B) Answer the following questions (any one out of two) (04)
- (1) Discuss gravitational plasma confinement and inertial plasma confinement.
 - (2) Explain three generations of quarks and leptons.
