PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2018
(First 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)

1 Find Quadrupole moment is exhibited by_____ .
(i) spherical nuclei (ii) ellipsoidal nuclei
(iii) both (i) and (ii) (iv) neither (i) or (ii)

2 According to shell model
(i) nucleons move independently in common static spherical potential
(ii) nucleons move independently in distorted spherical potential
(iii) nucleons are held in equilibrium under symmetric nuclear forces
(iv) nucleons have continuous energy state

3 Mention parity conservation is violated in_____ .
(i) strong nuclear interaction (ii) electromagnetic interaction
(iii) weak nuclear interaction (iv) all of above

4 Indicate gamma rays emission is associated with_____ .
(i) atomic energy states (ii) nuclear energy states
(iii) both (i) and (ii) (iv) neither (i) nor (ii)

5 Define nuclear forces are_____ .
(i) repulsive (ii) charge dependent
(iii) spin dependent (iv) long range

6 Identify Wigner operator exchanges _____ .
(i) positions of particles (ii) spin of particles
(iii) both positions and spin of particles
(iv) neither positions nor spin of particles

7 Find the life time of compound nucleus is of order of_____ .
(i) 10^{-10} s (ii) 10^{-14}s
(iii) 10^{-21} s (iv) Is

8 The neutron released in fission process are_____ ,
(i) slow neutrons only (ii) prompt neutrons only
(iii) delayed neutrons only (iv) prompt and delayed neutrons

9 In elementary particle physics, the mirror symmetry is known as_____ .
(i) isomerism (ii) strangeness
(iii) parity (iv) charge

10 Which of the following are fermions?
(i) Neutrino (ii) n - meson
(iii) n and n meson (iv) electrons.

SECTION - B *(35* Marks!
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5x7 = 35)

12 a Explain the characteristics of alpha ray spectra.

OR

b Bring out the theory of raultipole radiations and selection rule of gamma decays.

13 a Describe the charge independence of nuclear forces.

OR

b Explain meson theory of nuclear forces.

14 a Narrate the conservation laws involved in nuclear reaction.

OR

b What do you mean by nuclear fission? Explain its important characteristic and uses.

15 a Compare strong weak and electromagnetic interactions.

OR

b Describe Quark model.

SECTION - C (30 Marks)

Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Obtain an expression for Weizasckar's semi-empirical mass formula.

17 Discuss neutrino theory of beta decay.

18 Analyze simple theory of deuteron. Obtain and plot the wave function for the deuteron ground state taken as an s-state.

19 Elucidate Bohr wheeler theory of nuclear fission.

20 Classify elementary particles. Explain in detail.

Z-Z-Z END