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Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, MAY 2020

Fourth Semester

Faculty of Science

Branch II—Physics–A—Pure Physics

PH4 C12—NUCLEAR AND PARTICLE PHYSICS

(2012 Admissions—Regular)

(Common for All)

Time : Three Hours Maximum Weight : 30

Part A

Answer any **six** *questions.*
Each question carries a weight of 1.

1. What are Nucleons ? Explain.
2. Write down the expression for binding energy.
3. What is meant by Internal Conversion ?
4. Explain reaction cross-section.
5. What are Forbidden Decays ?
6. List the merits of shell model for nucleus.
7. What are Valence Nucleons ?
8. State the hazards in building fusion reactors.
9. What are Leptons ? Explain.
10. Explain quark-gluon interaction.

(6 × 1 = 6)

Part B

Answer any **four** *questions.*
Each question carries a weight of 2.

11. Give the reasons for excited states of nucleus.

Turn over

12. Narrate the properties of nuclear forces.

13. Obtain the collective structure for nucleus.

14. Discuss the fabrication and uses of controlled fission reactors.

15. Bring out the conservation of parity.

16. Briefly explain experimental evidences for quark model.

(4 × 2 = 8)

Part C

Answer **all** *questions.*
Each question carries a weight of 4.

17. (a) Describe the composition and properties of nucleus.

Or

(b) Discuss the nuclear exchange force model for nucleus with Yukawa's estimate.

18. (a) Explain beta decay with energy spectrum. Obtain the neutrino theory of beta decay.

Or

(b) Bring out direct reactions, heavy ion reactions and compound nucleus reactions with applications.

19. (a) Describe the liquid model of the nucleus and obtain a formula for its total energy.

Or

(b) Explain nuclear fusion. Describe the construction and working of a fusion nuclear reactor.

20. (a) Discuss the classification of elementary particles and various interactions.

Or

(b) Discuss the validity of grand unified theories for particle interactions.

(4 × 4 = 16)