18

D 91052 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER M.A./M.Sc./M.Com. DEGREE (REGULAR) EXAMINATION, NOVEMBER 2020

(CBCSS)

Physics

PHY 3C 10—NUCLEAR AND PARTICLE PHYSICS

(2019 Syllabus Year)

Time : Three Hours Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each Section / Part.*
2. *The minimum number of questions to be attended from the Section / Part shall remain same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to maximum weightage of the Section / Part.*

Section A

Answer **all** *questions.*

Each question carries weightage 1.

1. Show that the D state probability in Deuteron is roughly 4%.
2. What are magic numbers ? Why there are no magic numbers that are odd.
3. What is neutron and proton separation energy ?
4. What you meant by sub criticality and supercriticality condition in a fission reactor ?
5. Briefly explain the multipole moments.
6. Write the semi empirical mass formula. Briefly explain each term in semi empirical mass formula.
7. Parity is conserved in all strong or electromagnetic interactions, but is violated in week interactions. Justify the statement.
8. What are single channel and multichannel analyser ?

(8 × 1 = 8 weightage)

Turn over

Section B

Answer any **two** *questions.*
Each question carries weightage 5.

9. Starting from the n-p scattering explain the characteristics of a nuclear force.

10. Derive an expression for the total magnetic moment of the nucleus and explain with the he Schmidt diagram.

11. With a neat block diagram explain the working of a Scintillation detector.

12. Explain the conservation laws of elementary particles reaction.

(2 × 5 = 10 weigh

Section C

Answer any **four** *questions.*
Each question carries weightage 3.

13. Using the Shell model predict the ground state spin and parity of $^{17}_{8}O$ and $_{20}{}^{40}Ca$.

14. Bring out the angular momentum and parity selection rules in β decay.

15. Discuss the vibrational energy state of nucleus.

16. Discuss the strange behaviour of elementary particles. Calculate the strangeness of K^+, 'Ω

17. What is the principle of operation of ionisation chamber ?

18. Describe any *two* methods for the determination of nuclear mass.

19. Briefly explain nucleon-nucleon scattering.

(4 × 3 = 12 weig