B.Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2020
SEMESTER – 6: PHYSICS (CORE COURSE)
COURSE: 15U6CRPHY10: NUCLEAR AND PARTICLE PHYSICS

(Common for Regular - 2017 Admission & Supplementary 2016/2015/ 2014 Admissions)

Time: Three Hours   Max. Marks: 60

PART A (Very short answer questions)

*Answer **all** questions, each question carries **1** mark*

1. What are mirror nuclei?

2. What is packing fraction?

3. What are isotopes?

4. Mention any four properties of nuclear forces.

5. What is neutrino?

6. Define mean life of a radioactive element

7. Give the expression of Geiger- Nuttal law

8. Define multiplicity factor or reproduction factor of a chain reaction.

9. Give any two properties of graviton.

10. What are cosmic rays?   (1 x 10 = 10)

PART B (Short Answer Questions)

*Answer **any seven** questions. Each question carries **2** marks*

11. Explain mass defect.

12. Explain proton-neutron hypothesis of nucleus.

13. What is Carbon dating?

14. State Soddy's displacement law

15. Define half-life period of a radioactive substance

16. Is alpha particle spectrum discrete or continuous? Explain why?

17. Briefly explain Toroidal confinement.

18. Write the carbon nitrogen chain reaction in stars.

19. Distinguish between primary and secondary cosmic rays.   (2 x 7 = 14)

PART C (Problem/Derivations)

*Answer **any four** questions. Each question carries **4** marks*

20. Given the mass of ^{28}Ni$_{64}$ = 63.9280u. Calculate the Binding energy and Binding Energy per nucleon.

21. The radius of Ho^{165} is 7.731 fermi. Deduce radius of He^4.

22. Based on uncertainly principle, explain why electrons present in an atomic nucleus.

23. Calculate the time required for 20% of an isotope of thorium to disintegrate if its half-life period is 1.2×10^{10} years.

24. What is artificial radioactivity? Mention some of its applications

25. Give the latitude and altitude effect of cosmic rays.   (4 x 4 = 16)

PART D (Long answer questions)

*Answer **any two** questions. Each question carries **10** marks*

26. Describe Bainbridge's experiment to determine the atomic masses.

27. Give the Gamow's theory of alpha decay and explain it in detail.

28. Explain nuclear fission on the basis of liquid drop model and also write a note on chain reaction.

29. Discuss the quark model. Give the features of the different quarks. What is the quark composition of π^+, K^+ and Ω^- ?   (10 x 2 = 20)

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