

B. Sc. DEGREE (C.B.C.S.S) EXAMINATION, MARCH 2018**(2015 Admission Regular)****SEMESTER VI - CORE (PHYSICS)****PH6B10TB - NUCLEAR AND PARTICLE PHYSICS****Time : Three Hours****Maximum Marks : 60****Part A****I. Answer all questions. Each question carries 1 marks**

1. What is the saturation property of nuclear forces.
2. What is meant by range of an alpha particle.
3. Define decay constant of a radioactive element.
4. Mention the role of moderator in a nuclear reactor?
5. Give the difference between subatomic and fundamental particles.

(5x1=5)**Part B****II. Answer any Five questions. Each question carries 2 marks**

6. Write down Weizsacker semiempirical mass formula.
7. What you mean by mass defect ?
8. Explain internal conversion process.
9. What is k electron capture.
10. Explain the experimental determination of range of an alpha particle.
11. Write on breeder reactors?
12. What is meant by color of a quark?
13. What are resonance particles?

(5x2=10)**Part C****III. Answer any Five questions. Each question carries 5 marks**

14. Discuss about stability of nucleus and BE curve.
15. Alpha particles of energy 5 MeV pass through an ionization chamber at the rate of 10 per second. Assuming all the energy is used in producing ion pairs, calculate the current produced. (35 eV is required for producing an ion pair and $e = 1.6 \times 10^{-19} \text{ C}$).
16. If a radioactive element disintegrates for a period of time equal to its average life, what fraction of the original amount remains and what fraction will have disintegrated?
17. Compute the mass of 1 Curie of carbon 14. The half life of carbon 14 is 5570 years.
18. 1 g of Radium is reduced by 2.1 mg in 5 years by alpha decay. Calculate the half life of Radium.
19. Write a short note on proton-proton cycle.
20. List the elementary particle quantum numbers.
21. Classify the particles into bosons and fermions on the basis of their spin.

(5x5=25)**Part D****IV. Answer any Two questions. Each question carries 10 marks**

22. Explain any 5 properties of nucleus.
23. Explain theories of nuclear composition.
24. Deduce the law of successive disintegration. Explain radioactive dating and determination of age of earth.
25. (a) What is chain reaction? Explain the critical size of the fissile material to maintain chain reaction. (b) Write on atom bomb.

(2x10=20)