QP CODE: 21101107

21101107

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATION, APRIL 2021

Sixth Semester

CORE COURSE - PH6CRT11 - NUCLEAR, PARTICLE AND ASTROPHYSICS

Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications & B.Sc Physics Model III Electronic Equipment Maintenance

2017 Admission Onwards

4C8C0051

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. What are the elementary particles in a nucleus?
2. What is the empirical formula for nuclear radius?
3. Nuclear forces have saturation property. Explain.
4. What are the general utilizations of a Van de Graff generator?
5. What is alpha decay? Give an example for alpha decay.
6. Write down the general expression for nuclear reaction.
7. What is a breeder reactor?
8. What is east – west asymmetry of cosmic rays?
9. What is the average energy of cosmic ray particles reaching earth atmosphere at magnetic equator?
10. Name the six different leptons.
11. Define isospin.
12. What is the charge of a down quark?

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Calculate the binding energy of an alpha particle in MeV and in joules.
14. Calculate the atomic number of the most stable nucleus for a given mass number A.
15. Explain the evidences for nuclear shell model.

16. The magnetic field for a cyclotron is 3 Tesla. The extraction radius is 0.5m. Calculate the radiofrequency and the energy of the accelerated protons.

17. One gram of radium is reduced by 2.1mg in 5 years by alpha decay. Calculate the half life period of radium.

18. Explain the three β – decay processes using examples.

19. Explain the three Gamma decay processes.

20. If a star luminosity equal to the sun and is 10 light year away from the earth, how much faint will it appear?

21. Distinguish between white dwarf and neutron star.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. With Suitable diagram, explain the working of ionization chamber.

23. Describe how a scintillation counter can be effectively utilized in the study of nuclear radiation.

24. What are the four radioactive series? Name the parent isotope and the stable end product of all these radioactive series. Write down the Neptunium series from the parent isotope to the end product showing the α and β emissions.

25. Explain the symmetry and conservation laws in particle physics.

(2×10=20)