



K24U 0072

Reg. No. : .....

Name : .....

Sixth Semester B.Sc. Degree (C.B.C.S.S.-OBE – Regular/  
Supplementary/Improvement) Examination, April 2024  
(2019 to 2021 Admissions)

## CORE COURSE IN PHYSICS

## 6B12 PHY : Nuclear, Particle and Astrophysics

Time : 3 Hours

Max. Marks : 40

## SECTION – A

Answer **all** questions. **Each** carries 1 mark.

1. When the mass of an electron, proton and neutron are  $m_e$ ,  $m_p$  and  $m_n$  respectively, then the nuclear mass of an atom  ${}_Z X^A$  is \_\_\_\_\_
2. \_\_\_\_\_ type of nuclear reaction is responsible for liberation of energy in the nuclear reactor.
3. Strontium-90 is used for the treatment of \_\_\_\_\_
4. The spin of the quark is \_\_\_\_\_
5. The colour of a star is a measure of its \_\_\_\_\_
6. The brightest star in the night sky is \_\_\_\_\_ (6×1=6)

## SECTION – B

Answer **any six**. **Each** carries 2 marks.

7. Explain the term mass defect.
8. Define Q value of a nuclear reaction.
9. Write a note on  ${}_{92}^{235}\text{U}$  chain reaction.
10. What is Mossbauer effect ?

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11. What are Leptons ? Name them.
12. What is the concept of quark model ? What are the properties ?
13. What is cosmology in astronomy ?
14. How is a star born ? Explain. (6×2=12)

## SECTION – C

Answer **any four**. **Each** carries 3 marks.

15. Find the density of the  ${}^{12}\text{C}_6$  nucleus.
16. Calculate the energy released by fission of 1 kg of  $\text{U}^{235}$  in KWH. The energy released per fission is 200 MeV and avagadro number is  $6.023 \times 10^{23}$ .
17. If a star's surface temperature is 30,000 K, how much power does a square meter of its surface radiate.
18. Briefly explain about neutron stars.
19. Write a note on stellar winds.
20. Obtain an expression for internal temperature of a star. (4×3=12)

## SECTION – D

Answer **any two**. **Each** carries 5 marks.

21. State the law of radioactive decay. Drive an expression for it.
22. Briefly explain the fusion process in stars.
23. Explain the conservation laws in elementary particles.
24. What is Hertzsprung Russell diagram ? Discuss stellar mass and stellar radius. (2×5=10)