

Reg. No. :

Code No. : 30316 E Sub. Code : SMPH 63

(CBCS) DEGREE EXAMINATION, APRIL 2022

Sixth Semester

Physics — Core

NUCLEAR PHYSICS

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

Packing fraction formulae —

- (a) $f = \Delta m/A$ (b) $f = m/A$
(c) $f = A/m$ (d) $f = \Delta A/m$

Mass of the meson $275 \times$ mass of —

- (a) Proton (b) Electron
(c) Neutron (d) Positron

The insensitive period of G.M. counter is —

- a) 100 to 200 μs
b) 300 to 400 μs
c) 200 to 400 μs
d) 400 to 500 μs

In a bubble chamber a vapour bubbles forms in a superheated —

- a) Vapour (b) Gas
c) Solid (d) Liquid

East-west effect is maximum at the —

- a) Edge (b) Pole
c) Middle (d) Equator

The variation of cosmic ray intensity with altitude is called —

- a) Latitude effect (b) Azimuth Effect
c) Altitude effect (d) None

3. Beta particles mass equal to that of a —

- (a) Proton (b) Neutron
(c) Electron (d) Positron

4. Geiger-Nuttall law relation —

- (a) $\log \lambda = A - B \log R$
(b) $\log \lambda = A + B \log R$
(c) $\log \lambda = A + \log R$
(d) $\log \lambda = A + B \log R$

5. Nuclear reactor are used in the production of —

- (a) Electricity energy
(b) Wind energy
(c) Heat energy
(d) Thermal energy

6. The safety system protects against intensive Neutron flux and —

- (a) Beta rays (b) Gamma rays
(c) Alpha rays (d) None

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PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the general properties of nucleus.

Or

(b) Describe proton – neutron hypothesis.

12. (a) Explain the term radio carbon dating.

Or

(b) Describe the term nuclear isomers.

13. (a) Describe the term compound nucleus.

Or

(b) Describe the term hydrogen bomb.

14. (a) Explain term synchrocyclotron.

Or

(b) Describe term bubble chamber.

15. (a) Explain the term azimuth effect or east – west effect.

Or

- (b) Describe the Van Allen Belts.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the meson theory of nuclear force.

Or

- (b) Describe construction and working of liquid drop model.

17. (a) To describe experimental measurement of the range of alpha particles.

Or

- (b) Briefly explain the term of laws of successive disintegration.

18. (a) Explain principle and construction and working of atom bomb.

Or

- (b) Briefly explain the controlled thermo nuclear reaction.

19. (a) Briefly explain the principle, construction and working of Willson cloud chamber.

Or

- (b) Explain the principle, construction and working of cyclotron.

20. (a) Distinguish between latitude and azimuth effect.

Or

- (b) Explain the term conservation of laws and symmetry.