(6 Pages) Reg. No. : .....

Code No. : 10306 E **Sub. Code : AMPH 53**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Fifth Semester

Physics — Core

ATOMIC AND NUCLEAR PHYSICS

(For those who joined in July 2020 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Band gap energy of germanium is
   (a) 0.2 eV
   (b) 0.67 eV
   (c) 6 eV
   (d) 1.2 eV

2. Positive rays have ———
   (a) low penetrating power
   (b) high ionising power
   (c) low ionising power and high penetrating power
   (d) both (a) and (b)

3. The shell corresponds to n = 4 is
   (a) K (b) L
   (c) M (d) N

4. Normal Zeeman effect takes place in
   (a) weak magnetic field
   (b) strong magnetic field
   (c) weak electric field
   (d) strong electric field

5. Wavelength of Soft X-rays is of the order of
   (a) 10 Å (b) 100 Å
   (c) 2 Å (d) 20 Å

6. Charged particles are trapped to form Van Allen belt due to ——— field of earth.
   (a) magnetic (b) electric
   (c) gravitational (d) electromagnetic

7. One a.m.u. is equal to
   (a) 931 MeV (b) 931 eV
   (c) 931 KeV (d) 931 meV

8. During beta decay ——— remains constant.
   (a) Z (b) A
   (c) N (d) M

9. Hydrogen bomb works on the principle of
   (a) nuclear fusion (b) nuclear fission
   (c) alpha decay (d) beta decay

10. Proton is made up of
    (a) one quark (b) two quarks
    (c) three quarks (d) four quarks

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Give the principle of Hall effect.

Or

(b) Give the construction of Aston's mass spectrograph.

12. (a) Describe j-j coupling.

Or

(b) Explain the postulates of vector model of atom.

13. (a) What are called X-rays? List its properties.

Or

(b) What are cosmic ray showers? How are they produced?

14. (a) Obtain an expression for half-life a radioactive element.

Or

(b) Write down the properties of alpha rays.

15. (a) Explain the chain reaction.

Or

(b) Write notes on elementary particles.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) What is Hall effect? Obtain an expression for Hall coefficient of a metal and give its uses.

Or

(b) Explain the construction and working of Thomson's parabola method.

17. (a) Describe stern and Gerlach experiment with relevant theory. Discuss the importance of the results obtained.

Or

(b) What is Zeeman effect? Give the experiment and quantum mechanical explanation.

18. (a) Describe rotating crystal method to determine the cell dimensions of a crystal.

Or

(b) Analyse the effects of altitude and latitude on cosmic rays.

19. (a) Describe the liquid drop model of the nucleus.

Or

(b) Explain the construction and working of Betatron.

20. (a) Describe the construction and working of a nuclear reactor.

Or

(b) Explain the quark model.

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