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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2022-23 ONLY)

SUBJECT CODE 22 UPS 614

REG.NO.

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY– 2025

B.Sc. – PHYSICS **MAXIMUM MARKS: 50**

VI SEMESTER **TIME : 3 HOURS**

PART – III

ATOMIC AND NUCLEAR PHYSICS

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS. (K1)

1. When hydrogen atom emits Hα line of Balmer series, the angular momentum of electron undergoing this teransition changes by ……..
   a) h b) h/2π c) 2h/2π d) 3h/2π
2. Bragg's equation will have no solution if λ is ……..
   a) λ<2d b) λ>2d c) λ<d d) λ=d
3. The empirical formula for the nuclear radius is ……..
   a) $R = r_oA^{1/3}$ b) $R = r_oA^{1/2}$ c) $R = r_oA^{3/2}$ d) $R = r_oA^3$
4. The multiplication factor in a fission reaction is less than one , then the reaction is said to be ……..
   a) super critical b) critical c) sub-critical d) chain reaction
5. The proton and neutron in a nucleus are called
   a) hyperons b) pions c) nucleons d) mesons

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)

6. What is known as Paschen Back effect?
7. Write the Einestein Photo electric equation.
8. What is known as Beta decay?
9. What is the use of GM counter?
10. Define the term pair production.

SECTION – B (5 X 3 = 15 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) Describe the Sommerfeld's relativistic theory.

(OR)

b) State and explain Larmor's Theorem.

12. a) State Mosley's law and give its significance.

(OR)

b) Describe photo to electric effect through an experiment. **(CONTD …. 2)**

13. a) Write a note on Nuclear stability.

(OR)

b) Polonium-212 emits an α particles whose K.E is 10.54 MeV. Determine the α disintegration energy.

14. a) Explain chain reaction with an illustration

(OR)

b) Give an account of mode of operation of scintillation counter.

15. a) Classify the fundamental interactions with an explanation.

(OR)

b) What are known as primary and secondary cosmic rays ? Discuss.

SECTION – C (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4 (Or) K5)

16. a) Describe the vector atom model and discuss the quantum numbers associated with vector atom model.

(OR)

b) What is Zeeman effect? By applying Larmor's classical theory deduce the expression for Zeeman shift.

17. a) Describe the method of studying the crystal structure by powder crystal method.

(OR)

b) What is Compton effect? Deduce the expression for Compton shift while exhibits Compton scattering.

18. a) Explain the nuclear liquid drop model with the similarities of a liquid drop. Write Semi empirical mass formula and give detailed explanation on each term.

(OR)

b) Define "range of α particle". Describe an experiment to determine the range of α-particle and describe the Geiger Nuttal law with their experiment

19. a) Write about the construction and working of a nuclear reactor. When a reactor is said to be critical? .

(OR)

b) Describe a Geiger-Muller counter and explain its working as a particle detector.

20. a) What are elementary particles? Classify elementary particle with their salient features..

(OR)

b) Give an account of Quarks and Quark model.

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ETHICAL PAPER