



RAN-1009

T.Y.B.Sc. (Sem. V) Examination

March / April - 2019

Physics Paper VIII

(Atomic and Nuclear physics)

Time: 2 Hours]

[Total Marks: 50

सूचना : / Instructions

नीचे दृशविले निशानीवाणी विगतो उत्तरवही पर अवश्य लभवी.
Fill up strictly the details of signs on your answer book

Name of the Examination:

T.Y.B.Sc. (Sem. V)

Name of the Subject :

Physics Paper VIII

Subject Code No.: 1 0 0 9

Seat No.:

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Student's Signature

Instructions:

- (1) Figures to the right indicate total marks carried by the question.
- (2) All symbols used have their usual meaning.
- (3) Students are allowed to use a non-programmable scientific calculator.

Q1 Answer in brief:

[8]

- (1) Why the spectrum of sunlight has dark lines?
- (2) What is Bohr radius?
- (3) State De Broglie hypothesis.
- (4) Which series of hydrogen spectrum falls into infrared region?
- (5) What is pair production?
- (6) Define the range of the particle.
- (7) What is a frequency modulated cyclotron?
- (8) What are the mesons?

Q2 (A) Answer any one in detail: [10]

- (1) Discuss energy levels and spectra for Hydrogen atom
- (2) Write Schrodinger's equation in three dimensions for hydrogen atom. Discuss spherical polar co-ordinates and write Schrodinger's equation in spherical polar co-ordinates.

(B) Answer any one : [4]

- (1) If energy of hydrogen atom in its excited state is -7.19×10^{-5} eV. Find the quantum number of the Bohr orbit in a hydrogen atom. (Energy of hydrogen atom in its ground state is $= -13.6$ eV.)
- (2) Smallest Wavelength of the line in Paschen series is 820.3 nm. Calculate value of the Rydberg's constant.

Q3 (A) Answer any one in detail: [10]

- (1) Describe the construction and working of a cyclotron in detail. Derive equation of the energy of the ion.
- (2) Explain in detail about the proportional counter.

(B) Answer any one : [4]

- (1) Calculate the ionization current produced by 3 MeV deuterons passing through a gas at 1000 per second. Assuming that 25 eV is required to produce an ion pair
- (2) A cyclotron in which the flux density of 2.0 weber/m² is employed to accelerate protons. How rapidly should the electric field between the dees be reversed? (Proton mass = 1.67×10^{-27} kg and charge = 1.6×10^{-19} C)

Q4 Answer any two [14]

- (1) Explain space quantization using the uncertainty principle.
- (2) Discuss selection rules.
- (3) Discuss primary and secondary cosmic rays.
- (4) Write short note on solid-state detectors.
