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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**

સૂચના : / Instructions

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
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.:

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/m^2 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.
