UG Odd Semester Examination, 2022

EDUCATION B.Sc. B.Ed

(7th Semester)

Course No.: BSPH-702

(Quantum Mechanics, Plasma Physics & Atomic Physics)

Full Marks: 50

Pass Marks: 20

Time: 2 hours

The figures in the right margin indicate full marks for the question.
Answer the following five (5) questions

1. (a) Derive an expression for average population of Bosons at any arbitrary state 'i'.

   Hence show that chemical potential of Bose gas is negative. 5+5=10

   (b) Derive an expression for equation of state of Bose gas.

Or

2. (a) Derive an expression for average population of Fermions at any arbitrary state 'i'.

   (b) Derive an expression for equation of state of fermion gas. 5+5=10

3. (a) What is plasma?

   (b) Write short notes on plasma-oscillation.

   (c) Describe plasma criteria. 2+5+3=10

Or

4. (a) Write short notes on : Pineh effect.

(b) What is Van-Allen radiatation belt?

(c) Derive an expression for the Ambipolar diffusion coefficient.

3+3+4=10

5. Derive an expression for the Rutherford's differential scattering cross-section formula. 10

Or

6. (a) Write short notes on : 2+2+6=10

(i) Doublet fine structure

(ii) Characteristics X-ray spectra

(b) Show that speed of electron in first Bohr orbit is c/137.

7. (a) Discuss about the quantum numbers associated with vector atom model.

(b) Evaluate the terms that may arise with the following configurations : (Use LS coupling scheme) 4+3x2=10

(i) np, n′p (n=2, n′p=3)

(ii) 2p, 3d

Or

8. (a) Discuss about the limitations of sommer field atom model.

(b) Discuss about different quantum numbers associated with sommer field model.

(c) Write short notes on Pauli's exclusion principle. 3+4+3=10

9. (a) Describe the quantum mchanical explanation of normal Zeeman effect.

(b) Hence discuss the possible lines those may be observed due to the transition between n=2 (d) and n=1(p) states. 6+4=10

Or

10. (a) Derive an expression for the change in wave length (dλ) during comption scattering.

(b) Write short notes on : Auger effect. 8+2=10

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