PG2S-271-B-23

M.Sc. II Semester (CBCS) Degree Examination
PHYSICS
Basic Nuclear Physics
Paper : HCT - 2.1

Time : 3 Hours   **Maximum Marks :80**

Instructions to Candidates:

Answer any FOUR questions of 15 marks and TWO questions of 10 marks each.

1. a) Estimate nuclear unit radius by using mirror nuclei method.
    b) What are nucleon quantum numbers? Explain.   (12+3)

(OR)

2. a) Prove that bound state of deuteron is a greatly extended structure.
    b) Prove that nuclear forces are charge independent.   (8+7)

3. a) Explain the formation and decomposition of compound nucleus.
    b) Derive an expression for threshold energy of an endoergic reaction   (8+7)

(OR)

4. a) Discuss in detail energy level scheme for nuclei with infinite square potential
    b) Give the stability limits against spontaneous fission.   (10+5)

5. Give an account of Fermi theory of beta decay   (15)

(OR)

6. Derive an expression for stopping power of heavy charged particles   (15)

7. a) What are elementary particles? Give their classification   (5+10)
    b) Explain the process of stellar nucleo-synthesis.

(OR)

8. Give an account of fusion reactor   (15)

9. Write short notes on nuclear spin and dipole moment   (10)

10. Write a note on Conservation laws in nuclear reactions.   (10)

11. Give the construction and working of GM detector.   (10)

12. Write a note on four factor formula.   (10)

PG2S-275-B-23

M.Sc. II Semester (CBCS) Degree Examination

PHYSICS

Elementary Concepts In Physics

Paper : OET-2.1

Time : 3 Hours   **Maximum Marks :80**

Instructions to Candidates:

   Answer All questions of 15 marks each and any Two questions of 10 marks each.

1. a)   Distinguish between conservative and non-conservative forces.   (6+9)

    b)   Explain Newton's laws of motion.

(OR)

2. a)   Distinguish between inertial mass and gravitational mass   (6+9)

    b)   Write a note on types of satellites.

3. a)   Explain the phenomenon of diffraction due to a single slit.   (7+8)

    b)   Write a note on astronomical telescopes.

(OR)

4. a)   Explain the law of superposition of waves.   (8+7)

    b)   Write a note on resolving power of microscopes.

5. a)   Define Gauss' law in differential and integral forms.   (6+9)

    b)   Explain Faraday's laws of induction.

(OR)

6. a)   Discuss the salient features of Maxwell's equations.   (8+7)

    b)   Write a note on electric generators.

7. a) What are extensive and intensive thermodynamic properties? Explain. (7+8)

   b) Distinguish between reversible and irreversible thermodynamic processes.

(OR)

8. a) Explain Stoke's law. (8+7)

   b) Write a note on Reynold's number.

9. Explain Kepler's laws of planetary motion. (10)

10. Describe Young's double slit experiment. (10)

11. Explain Biot-Savart's law of magnetostatics. (10)

12. Write a note on entropy and enthalpy of a thermodynamic system. (10)

_____

PG2S-274-B-23

M.Sc. II Semester(CBCS)Degree Examination

PHYSICS

Plasma Physics

Paper : SCT-2.2

Time : 3 Hours   Maximum Marks :80

Instructions to Candidates:

Answer All questions of 15 marks each and Two questions of 10 marks each.

1. a) Write down some of the sources for occurrence of natural and artificial plasma.

    b) Describe the Debye shielding in plasma.   (10+5)

(OR)

2. a) Describe the mechanisms for plasma generation, confinement and loss.

    b) Explain the first and second adiabatic invariants with neat diagram   (6+9)

3. a) Outline the relation between plasma physics and electromagnetics.

    b) Obtain the equation of motion for a plasma fluid.   (5+10)

(OR)

4. a) Obtain the expression of fluid drifts parallel to B.

    b) Explain the plasma approximation.   (10+5)

5. a) Derive an expression for Landau damping and mention its physical significance.

    b) Obtain the expression for kinetic theory in plasma   (10+5)

(OR)

6. a) Explain in detail about the kinetic effects in a magnetic field

    b) What is ion Landau damping? Explain.   (10+5)

7. a) Define plasma oscillation. Explain in detail the representation of waves.

    b) Write a note on magneto sonic waves.   (10+5)

(OR)

8. a) Derive the dispersion relation for the propagation of electromagnetic waves in plasma when no magnetic field is applied ($B_o=0$)

    b) Explain how sound waves behave in plasma.   (10+5)

9. Write a note on criteria for plasma generation.   (10)

10. Obtain the expression of fluid drifts perpendicular to B.   (10)

11. Describe the plasma kinetics from statistical approach .   (10)

12. Write a note on hydromagnetic waves.   (10)

———————————————

PG2S-273-B-23

M.Sc. II Semester(CBCS)Degree Examination

PHYSICS

Atomic and Molecular Physics

Paper : SCT-2.1

Time : 3 Hours   Maximum Marks :80

Instructions to Candidates:

Answer All the questions of 15 marks each and two questions of 10 marks each.

1. a) Obtain the relation between Einstein's A and B coefficients.

    b) Describe the ground and excited states of helium   (7+8)

(OR)

2. a) Obtain the expression for magnetic interaction energy in LS coupling scheme for two electron atoms.

    b) Explain the gross structure of alkali elements   (9+6)

3. a) Distinguish between normal and anomalous Zeeman effects. Obtain the expression for magnetic interaction energy in case of Zeeman effect.

    b) Calculate the magnetic moment in Bohr magneton of an atom in $^2P_{1/2}$ and $^2D_{3/2}$ states

                                                                              (10+5)

(OR)

4. a) What is hyperfine structure? Explain the causes of hyperfine structure splitting.

    b) What is Stark effect? Explain its types   (9+6)

5. a) Describe diatomic vibrating molecule as a simple harmonic oscillator.

    b) Discuss the instrumentation of IR spectroscopy   (9+6)

(OR)

6. a) Discuss the intensity of vibrational-electronic spectra using Franck-Condon principle.

    b) State and explain Born-Oppenheimer approximation.   (10+5)

7. a) Explain the working principle of Neodymium laser.

    b) Obtain the threshold condition for laser oscillations   (7+8)

(OR)

8. a) Discuss the recording process in holography using suitable optical ray diagram.

   b) Explain the working principle of dye laser. (7+8)

9. Obtain the expression for magnetic interaction energy in case of j-j coupling. (10)

10. Explain hyperfine structure in two electron spectra. (10)

11. Describe the working principle of UV-Visible spectrophotometer. (10)

12. Explain any four types of population inversion techniques. (10)

_____

PG2S-271-B-23

M.Sc. II Semester (CBCS) Degree Examination

PHYSICS

Basic Nuclear Physics

Paper : HCT - 2.1

Time : 3 Hours   Maximum Marks :80

Instructions to Candidates:

Answer any FOUR questions of 15 marks and TWO questions of 10 marks each.

1. a)   Estimate nuclear unit radius by using mirror nuclei method.

    b)   What are nucleon quantum numbers? Explain.   (12+3)

(OR)

2. a)   Prove that bound state of deuteron is a greatly extended structure.

    b)   Prove that nuclear forces are charge independent.   (8+7)

3. a)   Explain the formation and decomposition of compound nucleus.

    b)   Derive an expression for threshold energy of an endoergic reaction   (8+7)

(OR)

4. a)   Discuss in detail energy level scheme for nuclei with infinite square potential

    b)   Give the stability limits against spontaneous fission.   (10+5)

5. Give an account of Fermi theory of beta decay   (15)

(OR)

6. Derive an expression for stopping power of heavy charged particles   (15)

7. a)   What are elementary particles? Give their classification   (5+10)

    b)   Explain the process of stellar nucleo-synthesis.

(OR)

8. Give an account of fusion reactor   (15)

9. Write short notes on nuclear spin and dipole moment   (10)

10. Write a note on Conservation laws in nuclear reactions.   (10)

11. Give the construction and working of GM detector.   (10)

12. Write a note on four factor formula.   (10)

_____