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SUBJECT CODE NO: - BB-2433

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (CBCGS) (Pattern 2022) S.Y SEM III

Examination November / December 2025

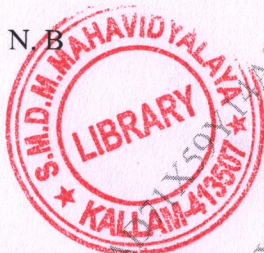
Physics-VIII Modern and Nuclear Physics

[Time: 1:30 Hours]

[Max. Marks: 40]

Please check whether you have got the right question paper.

N. B.



- 1) Attempt all questions.
- 2) Use of logarithmic table.
- 3) All questions carry equal marks.
- 4) Figures to the right indicates full marks.
- 5) Draw the neat diagram and gives equation wherever necessary.

Q1 Long answer questions (Solve any one)

10

- A) Describe applications of photocells.
- B) Discuss how the nuclear fusion is regarded as a source of stellar energy.

Q2 Long answer questions (Solve any one)

10

- A) Discuss the properties of laser beam.
- B) Explain in detail the cyclotron.

Q3 Short answer questions/problems

10

- A) Calculated energy in eV for a frequency of 1 Hz. (Given $h = 6.626 \times 10^{-34}$ JS)
- B) Write a short note on nuclear forces.

OR

- A) Find the relative population of the two states in of ruby laser that produces a light beam of wavelength 6943°A at 300°K and 500°K . (Given $hc = 12400 \text{ eV}$)
- B) Write a note on Van de Graaff accelerator.

Q4 Multiple choice questions.

10

- 1) What is the primary function of a photovoltaic cell?
 - a) Convert chemical energy into electrical energy
 - b) Convert solar energy into electrical energy
 - c) Store electrical energy
 - d) Convert electrical energy into mechanical energy

- 2) What happens when sunlight strikes a photovoltaic cell?
 - a) Electrons are released from atoms
 - b) The cell heats up and stores energy
 - c) Protons are absorbed and converted into electrons
 - d) The resistance of the material increases
- 3) The stopping potential in a photo-emissive cell is:
 - a) The voltage required to stop the emitted electrons
 - b) The voltage needed to start the emission of electrons
 - c) The potential at which maximum current flows
 - d) The potential where no photons are absorbed
- 4) Which type of cooling system is typically used in high-power CO lasers?
 - a) Air cooling
 - b) Water cooling
 - c) Passive cooling
 - d) Thermoelectric cooling
- 5) What is the role of a metastable state in achieving population inversion?
 - a) It increases the absorption of photons
 - b) It provides a longer lifetime for excited electrons
 - c) It decreases the laser output power
 - d) It reduces the efficiency of the laser
- 6) Nuclear binding energy is the energy required to:
 - a) Split an atom into electrons and protons
 - b) Bind the electrons to the nucleus
 - c) Hold the protons and neutrons together in the nucleus
 - d) Convert mass into energy
- 7) The Liquid Drop Model of the nucleus was proposed by:
 - a) Niels Bohr
 - b) Enrico Fermi
 - c) George Gamow
 - d) Carl Friedrich von Weizsäcker
- 8) The principle behind the working of an atom bomb is:
 - a) Nuclear fusion
 - b) Nuclear fission
 - c) Chemical reaction
 - d) Radioactive decay
- 9) In a linear accelerator, particles are accelerated using:
 - a) Magnetic fields
 - b) Alternating electric fields
 - c) Gravitational forces
 - d) Strong nuclear forces
- 10) Which of the following is an application of a synchrocyclotron?
 - a) Producing medical isotopes
 - b) Generating electricity
 - c) Producing X-rays for imaging
 - d) Cooling superconductors