M.Sc.

2011

2nd Semester Examination

PHYSICS

PAPER—PH-203

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Group—A

(Marks : 20)

Answer any *five* questions from the following : 2×5

(a) Draw Schematic circuit of a probe technique for the measurement of plasma parameter.

(b) Discuss with diagram the physical mechanism for the generation of electromagnetic oscillation in a plasma.

(c) Discuss the action of a magnetic mirror.

(d) What are the advantages of r·f probe method over the single probe method ?

(e) Explain Lawson criteria.

(f) Explain experimental aspects of toroidal pinch ef in partially ionized plasma.

(g) What are the major MHD instabilities in a lin pinch ?

(h) State and discuss the confinement of plasma magnetic field.

2. Answer any *one* bit : 10

(a) What do you mean by 'bremsstrahlung loss' ?

Find an expression for the energy radiated per u volume due to bremsstrahlung loss in plasma a discuss the loss mechanism.

2+7

(b) Give the schematic diagram of photomultiplier t type arrangement used for spectroscopic method. I is the electron temperature in a plasma determi by such spectroscopic method ?

Group—B

(*Marks : 20*)

1. Answer any *five* bits : 2×5

(a) Consider a rectangular waveguide, infinitely long in the x-direction with a width (y-direction) and height (z-direction). If the electric field in the z direction only, find out magnetic field vectors.

(b) If $\vec{A} = \hat{i}x^4 + \hat{k}z^2t^2$ in a source free region, obtain the expression of electric field and magnetic field vectors.

(c) What do you mean by classical radius of electron?

(d) An antenna radiates a power of 100 KW at 40 MHz. Estimate the strength of its electric field at a distance of 40 Km from the source.

(e) Write field vectors interms of electromagnetic potentials. What is Lorentz gauge?

(f) What do you mean by cherenkov radiation?

(g) Show that $E^2 - C^2B^2$ is relativistically invariant.

(h) A classical hydrogen atom has the electron at a radius equal to the first Bohr radius at time t = 0. Calculate an expression for the time it takes the radius to decrease to zero due to radiation.