

Unit 12 - Week 11

Course outline

How does an NPTEL online course work?

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

- Particle Motion in Uniform Electric Field
- Particle Motion in Uniform Magnetic Field
- Particle Motion in Uniform Magnetic Field and Guiding Center
- Particle Motion in Uniform Electric and Magnetic Fields
- Gradient Magnetic Field
- Quiz : Assignment 11
- Assignment 11 Solution

Week 12

DOWNLOAD VIDEOS

FEEDBACK

Assignment 11

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-04-15, 23:59 IST.

1) A particle with charge q and mass m is placed in a uniform static electric field, then: **1 point**

- particle's velocity linearly increases with respect to time
- the total energy is conserved in this motion
- the work done by electric field is zero in this motion
- all of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
all of the above

2) A charged particle moves in a uniform magnetic field. The velocity of the particle at some instant makes an acute angle with the magnetic field. The path of the particle will be: **1 point**

- a circle
- a helix with uniform pitch
- a helix with non-uniform pitch
- a helix with non-uniform radius

No, the answer is incorrect.
Score: 0

Accepted Answers:
a helix with uniform pitch

3) Compute Larmor radius (in meters) for the cases of a 1-keV He⁺ ion in the solar atmosphere near a sunspot, where $B=5 \times 10^{-2}$ T. (The velocity parallel to magnetic field is negligible). **1 point**

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.100,0.250

4) Some astrophysicists believe that the radio signals of 10^9 Hz reaching us from Jupiter are emitted by electrons orbiting in Jupiter's magnetic field. Assuming the frequency of the radio emission is identical to the cyclotron frequency; find the strength of the magnetic field(in Tesla) around Jupiter. **1 point**

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.02,0.04

5) A solar wind proton with streaming velocity 300 km/s in a magnetic field of $B=5 \times 10^{-9}$ T, has precession radius **1 point**

- 120 km
- 163 km
- 626 km
- 321 km

No, the answer is incorrect.
Score: 0

Accepted Answers:
626 km

6) An ion engine has a one Tesla magnetic field, and a hydrogen plasma is to be shot out at an $E \times B$ velocity of 1000 km/s. How much internal electric field must be present in the plasma?(Electric and magnetic fields are perpendicular to each other). **1 point**

- 10^6 V/m
- 10^5 V/m
- 10^7 V/m
- 10^3 V/m

No, the answer is incorrect.
Score: 0

Accepted Answers:
 10^6 V/m

7) Find the Larmor radius (cm) of a 3.5-MeV He⁺⁺ ash particle in an 8-T DT fusion reactor. **1 point**

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 3.30,3.40

8) The electrons lose energy as they emit radiation. What effect, if any, will this have on the frequency of the radio signals detected? **1 point**

- frequency increases
- frequency decreases
- frequency remains constant
- oscillations in frequency

No, the answer is incorrect.
Score: 0

Accepted Answers:
frequency remains constant

9) The Larmor radius of a 10-keV electron in the earth's magnetic field of 5×10^{-5} T is **1 point**

- 3.45 cm
- 6.75 cm
- 2.3 m
- 5.75 m

No, the answer is incorrect.
Score: 0

Accepted Answers:
6.75 cm

10) In general, the trajectory of a charged particle in crossed electric and magnetic fields is a cycloid. if $v = v_0x$, $B = B_0z$, and $E = E_0y$, **0 points**

- circle
- straight line
- helix
- exponential

No, the answer is incorrect.
Score: 0

Accepted Answers:
straight line