

C 5164

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Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT)  
EXAMINATION, MAY 2016

(UG—CCSS)

Complementary Course

PH 4C 07—ELECTRICITY, MAGNETISM AND NUCLEAR PHYSICS

(2009—2012 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Section A

Answer all questions.

Each question carries  $\frac{1}{4}$  weightage.

1. A condenser is connected across another charged condenser. The energy in the two condensers will be :
  - (a) Equal to the energy in the initial condenser.
  - (b) Less than that in the initial condenser.
  - (c) More than that in the initial condenser.
  - (d) None of these.
2. Work done in moving a unit positive charge through a distance of  $x$  metre on an equipotential surface is :
  - (a)  $x$  joule.
  - (b)  $(1/x)$  joule.
  - (c) Zero.
  - (d)  $x^2$  joule.
3. Which of the following statements is true ?
  - (a) A galvanometer with low resistance in parallel is an ammeter.
  - (b) A galvanometer with high resistance in parallel is an ammeter.
  - (c) A galvanometer with low resistance in series is an ammeter.
  - (d) A galvanometer with high resistance in series is an ammeter.
4. Susceptibility of a substance was found to vary inversely with temperature. The substance must have been :
  - (a) Ferromagnetic.
  - (b) Diamagnetic.
  - (c) Paramagnetic.
  - (d) Antiferromagnetic.

Turn over

5. Charge of a beta particle is \_\_\_\_\_
6. Pion is a :  
 (a) Baryon.  
 (b) Meson.  
 (c) Lepton.  
 (d) None of the above.
7. Longitude effect of cosmic rays is attributed to the fact that earth's magnetic field is \_\_\_\_\_ about its axis.
8. \_\_\_\_\_ are atoms of the same element with same proton number but different neutron number.
9. In the northern hemisphere, do the magnetic lines of force due to earth's field point towards or away from earth ?
10. \_\_\_\_\_ is a modified form of Wheatstone bridge for measuring small resistances.
11. A piece of copper and another of germanium are cooled from room temperature to  $40^{\circ}\text{C}$ . The resistance of :  
 (a) Each of them decreases.  
 (b) Each of them increases.  
 (c) Copper increases and germanium decreases.  
 (d) Copper decreases and germanium increases
12. Where is the vertical component of earth's magnetic field zero ?

### Section B (Short Answer Type Questions)

(12  $\times$   $\frac{1}{4}$  = 3 weightage)

Answer all questions.

Each question carries 1 weightage.

13. When is an electric field line curved ?
14. State tangent law in magnetism.
15. What are cosmic rays ?
16. Soft iron is used for making electromagnets. Why ?
17. Define declination.
18. Define nuclear fission with an example.
19. What is coercivity ?
20. What is Higg's boson ?
21. What is a moderator in a nuclear reactor ? Give an example.

### Section C (Short Essay or Paragraph Questions)

*Answer any five questions.*

*Each question carries 2 weightage.*

22. Distinguish between alpha particle, beta particle and gamma rays.
23. 1 gram of a radioactive substance disintegrates at the rate of  $3.7 \times 10^{10}$  disintegrations per second. The atomic weight of the substance is 226. Calculate its mean life.
24. A cyclotron in which the flux density is  $1.4 \text{ weber/m}^2$  is employed to accelerate protons. How rapidly should the electric field between the dees be reversed?  
Mass of proton =  $1.67 \times 10^{-27} \text{ kg}$ , Charge of electron =  $1.6 \times 10^{-19} \text{ C}$ .
25. A magnet makes 10 oscillations per minute at one place and takes 5 seconds to complete one oscillation at another place. Compare the values of horizontal components of earth's field at the two places.
26. What happens to the drift velocity of electrons and the resistance if the length of a conductor is doubled (keeping potential difference unchanged)?
27. A galvanometer with a coil of resistance 12 ohm shows a full scale deflection for a current of 2.5 mA. How will you convert it into a voltmeter of range 7.5 V? Also find the resistance of voltmeter formed.
28. Write short note on linear accelerator.

(5 × 2 = 10 weightage)

### Section D (Essay Questions)

*Answer any two questions.*

*Each question carries 4 weightage.*

29. Explain the principle of Carey Foster's bridge. Discuss with necessary circuit diagrams, how a Carey Foster's bridge is used for measuring small resistances.
30. Explain the working principle of deflection magnetometer. Discuss how a deflection magnetometer is used for determining the moment of a magnet in tan A and tan B positions.
31. Describe the construction and working of a cyclotron. Discuss its limitations.

(2 × 4 = 8 weightage)