

C 62074

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Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, MAY 2014

(U.G.—CCSS)

Complementary Course—Physics

PH 4C 07—ELECTRICITY, MAGNETISM AND NUCLEAR PHYSICS

Time : Three Hours

Maximum : 30 Weightage

Section I*Answer all twelve questions.**Each question carries $\frac{1}{4}$ weightage.*

1. A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. The potential at the centre of the sphere is :
 - (a) Zero.
 - (b) Infinity.
 - (c) 10 V.
 - (d) 2 V.
2. The capacity of a parallel plate conductor is C. If the separation between the plates is halved its capacity will be :
 - (a) 4C.
 - (b) 2C.
 - (c) C.
 - (d) Zero.
3. Potentiometer is preferred to a voltmeter to measure voltage in a circuit because :
 - (a) Potentiometer draws no current during measurement.
 - (b) Potentiometer draws heavy current during measurement.
 - (c) Potentiometer has a large range.
 - (d) None of the above.
4. Earth's magnetic field has a horizontal component except at :
 - (a) Equator.
 - (b) Magnetic poles.
 - (c) 60° latitude.
 - (d) 45° latitude.
5. The susceptibility of a diamagnetic substance :
 - (a) Decrease with increase in temperature.
 - (b) Increases with temperature.
 - (c) Does not vary with temperature.
 - (d) Fluctuates with increase in temperature.

Turn over

6. In a moving coil galvanometer the deflection of the coil is related to electric current as :

- (a) $i \propto \theta$. (b) $i \propto \tan \theta$.
 (c) $i \propto \sqrt{\theta}$. (d) $i \propto \theta^2$.

7. To send 10% of the main current through a moving coil galvanometer of resistance 99Ω , shunt required is :

- (a) 0.9Ω . (b) 9.9Ω .
 (c) 100Ω . (d) 11Ω .

8. The non-existence of magnetic monopole is explained by :

- (a) Gauss law. (b) Lorentz law.
 (c) Coulomb's law. (d) Fleming's rule.

9. The radioisotope used to study thyroid gland is :

- (a) Cobalt. (b) Carbon.
 (c) Iodine. (d) Lead.

10. Solar energy arises chiefly due to :

- (a) Nuclear fusion. (b) Nuclear fission.
 (c) Pair production. (d) Chemical reaction.

11. The great majority of cosmic ray secondary particles are :

- (a) Neutrinos. (b) Muons.
 (c) Antineutrino. (d) Neutrons.

12. According to the colour hypothesis all three quarks in a baryon have _____.

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

Section II

Answer all questions.

Each question carries 1 weightage.

13. What is a dielectric ?

14. What is an equipotential surface ?

15. What is superconductivity ?

16. What is drift velocity ? What is the approximate order of drift velocity ?

17. How are the susceptibility and relative permeability of a specimen related ?

18. How does an electromagnet differ from a permanent magnet ?

19. What is the role of a moderator in a nuclear reactor ?
20. What are nuclear forces ? Give one property.
21. What are leptons ? Give example.

(9 × 1 = 9 weightage)

Section III

Answer any **five** questions.
Each question carries 2 weightage.

22. Derive an expression for the capacity of a parallel plate condenser.
23. A copper wire of length 10 m has a resistance of 2Ω /metre at 20°C . If the temperature coefficient of resistance is $3.79 \times 10^{-4}/^\circ\text{C}$, calculate the resistance at 50°C .
24. Define (a) Declination ; (b) Dip ; (c) Horizontal intensity. What is the relation between DIP and horizontal intensity ?
25. Explain the principle and working of a Tangent galvanometer. Give one application.
26. Explain the mechanism of accelerating a proton in a cyclotron.
27. A certain radioactive element has a half life of 20 days. How long will it take for $\frac{3}{4}$ of the atoms originally present to disintegrate ?
28. Explain the quark hypothesis.

(5 × 2 = 10 weightage)

Section IV

Answer any **two** questions.
Each question carries 4 weightage.

29. Explain the principle of working of a galvanometer. How is it converted into (a) Voltmeter ; (b) Ammeter.
30. Describe the Searle's vibration magnetometer method of determining the horizontal intensity of the earth's magnetic field.
31. Give an account of the law of disintegration of radioactive substances. Deduce from this law the value of (a) half life ; (b) mean life.

(2 × 4 = 8 weightage)