

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH 2013

(CCSS)

Physics

PH4 C07—ELECTRICITY, MAGNETISM AND NUCLEAR PHYSICS

Time : Three Hours

Maximum : 30 Weightage

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

1. Two charges are placed at a fixed distance apart. If a glass slab is placed between them, the force will :
 - (a) Increase.
 - (b) Decrease.
 - (c) Remains the same.
 - (d) Become zero.
2. An electric charge in uniform motion produces :
 - (a) An electric field.
 - (b) An magnetic field.
 - (c) Both electric and magnetic field.
 - (d) Neither electric nor magnetic field.
3. The potential inside a hollow spherical conductor
 - (a) Is a constant.
 - (b) Varies inversely as the distance from the centre.
 - (c) Varies directly as the distance from the centre.
 - (d) Varies inversely as the square of the distance from the centre.
4. The capacity of a parallel plate condenser is C. Its capacity when the separation between the plates is halved will be :
 - (a) $4C$.
 - (b) $2C$.
 - (c) $\frac{C}{2}$.
 - (d) $4C$.
5. The sensitivity of moving coil galvanometer depends on :
 - (a) The angle of deflection.
 - (b) Earth's magnetic field.
 - (c) Torsional constant of spring.
 - (d) Moment of inertia of the coil.

Turn over

6. The coil of a tangent galvanometer is put in the magnetic meridian to :
- Avoid the magnetic effect of the earth field.
 - Produce intense magnetic field at the centre of the coil.
 - Avoid error due to parallax.
 - Produce a field at right angles to the earth's field.
7. A potentiometer is an ideal instrument for measuring e.m.f. because :
- It has a long wire.
 - It does not disturb the p.d. it measures.
 - It has a sensitive galvanometer.
 - None of the above.
8. The magnetic field at which superconductivity variables is called _____
9. The density ' d ' of nuclear matter varies with nucleon number A as :
- $d \propto A^3$.
 - $d \propto A^{\frac{1}{3}}$.
 - $d \propto A$.
 - $d \propto A^0$.
10. Which one of the following will penetrate in a thin glass slab ?
- α -rays.
 - β -rays
 - γ -rays
 - Cathode rays.
11. A good modulator should :
- Not be a gas only.
 - Not have appetite for neutrons only.
 - Be light in mass number only.
 - Be all the above.
12. The field that binds the quarks is :
- Electric field.
 - Colour field.
 - Magnetic field.
 - Gravitational field.

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

Section II

Answer **all** questions.

Each question carries a weight of 1.

- Define electric field intensity at a point.
- What is an equipotential surface ? Mention one property.
- How does the drift velocity of an electron in a metallic conductor vary with increase in temperature ?
- Why is diamagnetism almost independent of temperature.
- Why are manganin wires preferred for the manufacture of standard resistances ?
- How is a deflection magnetometer set in the tan B position ?
- What is the principle of working of a nuclear bomb ?
- What are nuclear forces ? Give its characteristics.
- What are Leptons ?

(9 x 1 = 9 weightage)

Section III

*Answer any **five** questions.
Each question carries a weight of 2.*

22. A -parallel plate capacitor of area 2 m^2 with a dielectric constant 7 is charged to a potential of 100 V. if the plate separation is $1 \times 10^{-4} \text{ m}$., calculate the capacitance and the energy stored in the capacitor.
23. An ammeter and a resistance 1090Ω are connected in **series** with 110 V mains. The ammeter reads 9.1 A. What is its resistance ? A voltmeter is connected across the terminals of the 1090 resistance. What voltage will it record ?
24. What is a Carey Fosters bridge ? Where is it used ?
25. Define the magnetic elements.
26. If 10 % of a radioactive element decays in 5 days, calculate the amount of the element left after 20 days.
27. Explain the phenomenon of carbon dating.
28. Briefly explain the theory. of the origin of the universe.

(5 x = 10 weightage)

Section IV

*Answer any **two** questions.
Each question carries a weight of 4.*

29. Explain the principle and working of a potentiometer. Describe an experiment to determine the resistance of a wire using potentiometer.
30. Give a law of disintegration of a radioactive substance. Derive an expression for the half-life of a radioactive element.
31. Explain the principle and working of a cyclotron. An electron beam entering a uniform magnetic field of intensity $.1.4 \text{ Weber/m}^2$ is deflected along a path of radius of curvature 10^{-6} m . Calculate the velocity of the electron.

(2 x 4 = 8 **weightage**)

**SECOND SEMESTER B.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION
DECEMBER 2012**

Physics—(Complementary Course)

PH 2C 03—MECHANICS, WAVES, RELATIVITY AND OSCILLATIONS

Time : Three Hours

Maximum : 30 Weightage

Section A

Answer all the questions.

1. A body is projected at an angle to the horizontal. Then path of the body in a frame of reference which is moving with velocity equal to horizontal component of velocity of body :
 (a) Vertical straight line. (b) Horizontal straight line.
 (c) Parabola. (d) Hyperbola.
2. A plumb line is suspended from the roof of a rail road car. When car is moving on a circular track, the plumb line inclines ?
 (a) Forward. (b) Rearward.
 (c) Towards centre of path. (d) Away from centre of path.
3. Two trains A and B are running in same direction on parallel roads such that A is faster than B, Packets of equal weight are transferred between them. What do you think will happen due to this ?
 (a) A will be accelerated B will be retarded.
 (b) B will be accelerated A will be retarded.
 (c) No change in A but B will be accelerated.
 (d) No change in B but A will be accelerated.
4. A satellite is revolving round earth, which of the following is not conserved :
 (a) Linear momentum. (b) Angular momentum.
 (c) Areal velocity. (d) Total energy.
5. An object of mass 'm' moving with a velocity u is approaching a second object of same mass at rest. Total kinetic energy as viewed from the centre of mass is :
 (a) $m u$ (b) $\frac{1}{2} m u^2$.
 (c) $\frac{1}{4} m u^2$ (d) None of these.

Turn over

6. Eigenvalue of the operator $\frac{d}{dx}$ is 5 then corresponding eigenfunction is :
- (a) $5x$. (b) $\sin 5x$.
 (c) e^x (d) 5.
7. If frequency in S.H.M. is f then frequency of its kinetic energy is :
- (a) 2 (b) f .
 (c) $2f$. (d) $4f$.
8. The equation for progressive wave is $Y = 10 \sin 2\pi (5t - 20x)$. Then wavelength of wave is :
- (a) 50. (b) 20.
 (c) 0.5. (d) 0.05.
9. Which of the following frames of reference is non-inertial ?
- (a) A car in circular motion.
 (b) A car in uniform motion.
 (c) A car at rest.
 (d) A car is moving along straight line with same velocity.
10. If speed of a body of rest mass m and length L in the direction of motion is L , is equal to speed to light, Then its relativistic mass and length are :
- (a) m , L . (b) 0, 0.
 (c) 0, Infinity. (d) Infinity, 0.
11. Amplitude of damped oscillations :
- (a) Increases linearly with time.
 (b) Decreases linearly with time.
 (c) Increases exponentially with time.
 (d) Decreases exponentially with time.
12. Energy radiated per unit volume through progressive waves is :
- (a) Directly proportional to amplitude.
 (b) Directly proportional to square of the amplitude.
 (c) Inversely proportional to amplitude.
 (d) Inversely proportional to square of amplitude.

(12 x = 3 weightage)