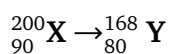


General Instructions

- (i) The test is of 1 hour duration.
- (ii) The question paper consists of 50 questions. The maximum marks are 250.
- (iii) 5 marks are awarded for every correct answer, and 1 mark is deducted for every wrong answer.

1. What are the respective numbers of α and β particles emitted respectively in the following radioactive decay?



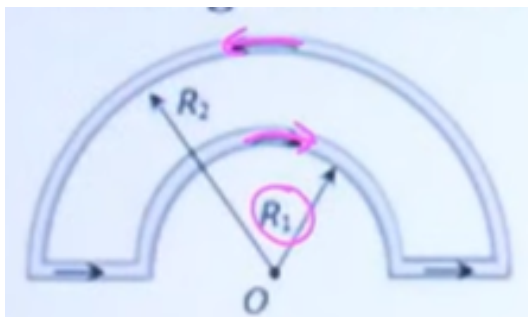
- (A) 8 and 8
- (B) 8 and 6
- (C) 6 and 8
- (D) 6 and 6

2. Current I is flowing in conductor shaped as shown in the figure. The radius of the curved part is r and the length of straight portion is very large. The value of the magnetic field at the centre O will be



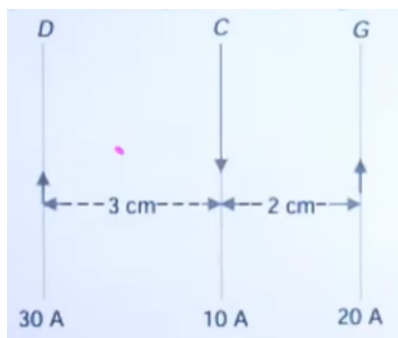
- (A) $\frac{\mu_0 I}{4\pi r} \left(\frac{3\pi}{2} + 1 \right)$
 (B) $\frac{\mu_0 I}{4\pi r} \left(\frac{3\pi}{2} - 1 \right)$
 (C) $\frac{\mu_0 I}{4\pi r} \left(\frac{\pi}{2} + 1 \right)$
 (D) $\frac{\mu_0 I}{4\pi r} \left(\frac{\pi}{2} - 1 \right)$

3. The magnetic induction at the centre O in the figure shown is



- (A) $\frac{\mu_0 i}{4} \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$
 (B) $\frac{\mu_0 i}{4} \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$
 (C) $\frac{\mu_0 i}{4} (R_1 - R_2)$
 (D) $\frac{\mu_0 i}{4} (R_1 + R_2)$

4. Three long, straight parallel wires, carrying current, are arranged as shown in figure. The force experienced by a 25 cm length of wire C is



- (A) 10^{-3} N
 (B) 2.5×10^{-3} N
 (C) Zero
 (D) 1.5×10^{-3} N

5. A steady current I flow through a long straight wire of radius ' a '. The current is uniformly distributed across its cross section. The ratio of the magnetic fields due to the wire at distance $\frac{a}{4}$ and $3a$ respectively from the axis of the wire is

- (A) 3 : 4
- (B) 4 : 3
- (C) 2 : 3
- (D) 1 : 4

6. The nucleus of helium atom contains two protons that are separated by a distance 3.0×10^{-15} m. The magnitude of the electrostatic force that each proton exerts on the other is

- (A) 20.6 N
- (B) 25.6 N
- (C) 15.6 N
- (D) 12.6 N

7. Under the action of a given coulombic force the acceleration of an electron is 2.5×10^{22} m s⁻². Then the magnitude of the acceleration of a proton under the action of same force is nearly

- (A) 1.6×10^{11} m s⁻²
- (B) 9.1×10^{31} m s⁻²
- (C) 1.5×10^{11} m s⁻²
- (D) 1.6×10^{22} m s⁻²

8. If the charge on an object is doubled then electric field becomes

- (A) half
- (B) double
- (C) unchanged
- (D) thrice

9. Which of the following statements is not true about electric field lines?

- (A) Electric field lines start from positive charge and end at negative charge.
- (B) Two electric field lines can never cross each other.
- (C) Electrostatic field lines do not form any closed loops.
- (D) Electric field lines cannot be taken as continuous curve

10. Two infinite plane parallel sheets, separated by a distance d have equal and opposite uniform charge densities σ . Electric field at a point between the sheets is

- (A) $\frac{\sigma}{2\epsilon_0}$
- (B) $\frac{\sigma}{\epsilon_0}$
- (C) zero
- (D) depends on the location of the point