QB365 Question Paper Software
12th Standard - Physics
Electromagnetic Induction Assertion and reason

Exam Time: 00:20 Hrs | Date: 2025-09-30
Total Marks: 10

Questions:

1. **Assertion (A) :** When two coils are wound on each other, the mutual induction between the coils is maximum.
Reason (R) : Mutual induction does not depend on the orientation of the coils.
Codes:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is NOT the correct explanation of A
(c) A is true but R is false
(d) A is false and R is also false

2. **Assertion (A) :** Changing magnetic flux can produce induced e.m.f ..
Reason (R) : Faraday established induced e.m.f experimentally
Codes:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is NOT the correct explanation of A
(c) A is true but R is false
(d) A is false and R is also false

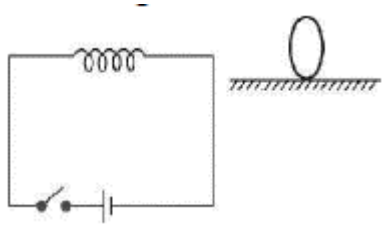
3. **Assertion (A) :** When number of turns in a coil doubled, coefficient of self inductance of the coil becomes four times.
Reason (R) : Coefficient of self inductance is proportional to the square of number of turns.
Codes:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is NOT the correct explanation of A
(c) A is true but R is false
(d) A is false and R is also false

4. **Assertion (A)** : An artificial satellite with a metal surface is moving above the earth in a circular orbit. A current will be induced in satellite if the plane of the orbit is inclined to the plane of the equator.
Reason (R) : The current will be i~duced only when the speed of satellite is more than 8 km/sec.
Codes:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is NOT the correct explanation of A
(c) A is true but R is false
(d) A is false and R is also false

5. **Assertion :** Faraday's laws are consequence of conservation of energy.
Reason : In a purely resistive ac circuit, the current legs behind the emf in phase.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

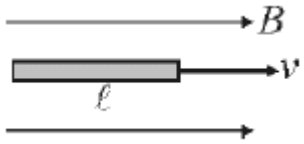
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

6. **Assertion :** Figure shows a horizontal solenoid connected to a battery and a switch. A copper ring is placed on a smooth surface, the axis of the ring being horizontal. As the switch is closed, the ring will move away from the solenoid.



Reason : Induced emf in the ring, $e=-d\Phi/dt$
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

7. **Assertion :** Figure shows a metallic conductor moving in magnetic field. The induced emf across its ends is zero.



Reason : The induced emf across the ends of a conductor is given by $e = B v \ell \sin\theta$.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

8. **Assertion :** At any instant, if the current through an inductor is zero, then the induced emf may not be zero.
Reason : An inductor tends to keep the flux (i.e. current) constant.
Codes:
(a) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.
(c) If Assertion is true but the Reason is false.
(d) If Assertion & Reason both are false.

9. **Assertion :** When a bar magnet moves along the axis of conducting coil, then its kinetic energy and a part of magnetic energy of bar magnet is converted into electrical energy of

coil.

Reason : Lenz law is based on conservation of energy.

Codes:

(a) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.

(b) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.

(c) If Assertion is true but the Reason is false.

(d) If Assertion & Reason both are false.

10. **Assertion :** We use a thick wire in the secondary of a step down transformer to reduce the produced heat.

Reason : When the plane of the armature coil is parallel to the line of force of magnetic field, the magnitude of induced e.m.f. is maximum.

Codes:

(a) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.

(b) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.

(c) If Assertion is true but the Reason is false.

(d) If Assertion & Reason both are false.

Answers Key:

1. **(c):** The manner in which the two coils are oriented, determines the coefficient of coupling between them i.e., $K = \sqrt{\frac{M}{L_1 L_2}}$, where L, and L2 are self-inductance of two coils. When the two coils are wound on each other, the coefficient of coupling is maximum and hence mutual inductance between the coil is maximum.
2. **(b):** E.m .f. induces, when there is change in magnetic flux. The magnitude of induced e.m.f depends upon the rate at which the magnetic flux changes. When magnetic flux is steady or constant no e.m.f is induced. Faraday did experiment in which, there is relative motion between the coil and magnet, the flux linked with the coil changes and e.m.f induces.
3. **(a):** The coefficient of self inductance of the coil is given by $L = \frac{\mu_0 N^2 A}{l}$ where N is number of turns, 1 is length of the coil and A is area of coil, so $L \propto N^2$
4. **(c):** When the satellite move in inclined plane with equatorial plane the value of magnetic field will change both in magnitude and direction. Due to this, the magnetic flux through the satellite will change and hence induced currents will be produced in the metal of the satellite. But no current will induce if satellite orbits in the equatorial plane because the magnetic flux does not change through the metal of the satellite in this plane.
5. (c) If the Assertion is correct but Reason is incorrect.

   Explanation:

   In purely resistive circuit, the current and emf are in the same phase.
6. (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

   Explanation:

   When switch is closed , the magnetic flux through the ring will increase and so ring will

move away form the solenoid so as to compensate this flux. This is according to Lenz's law.

7. (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
8. (b) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.
9. (a) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
10. (b) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.