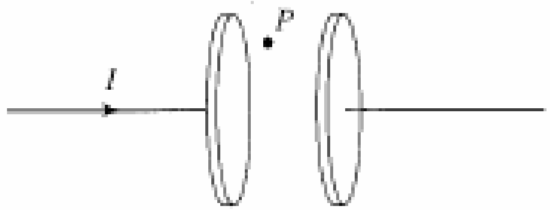
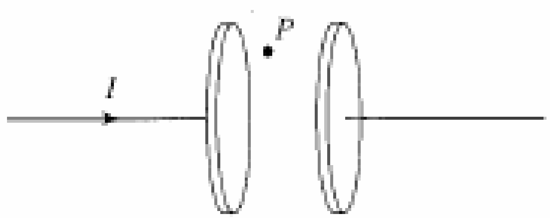
As the capacitor shown below is charged with a constant current I, at point P there is a



1. constant electric field.
2. changing electric field.
3. constant magnetic field.
4. changing magnetic field.
5. changing electric field and a magnetic field.

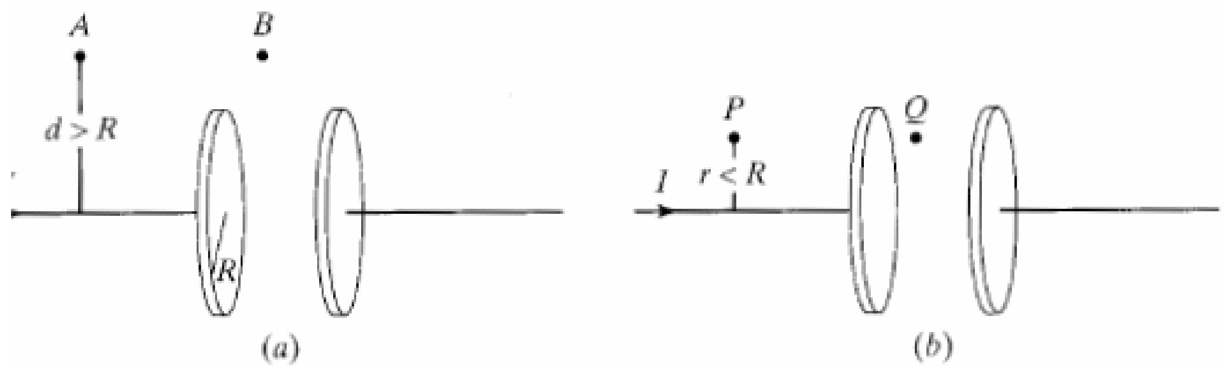
As the capacitor shown below is charged with a constant current I, at point P there is a



1. constant electric field.
2. changing electric field.
3. constant magnetic field.
4. changing magnetic field.
5. changing electric field and a magnetic field.

Answer: 5. As the charge on the capacitor increases, the electric field increases. The changing electric field, in turn, generates a magnetic field.

For a charging capacitor, the total displacement current between the plates is equal to the total conduction current I in the wires. The capacitors in the diagram have circular plates of radius R. In (a), points A and B are each a distance $d > R$ away from the line through the centers of the plates; in this case the magnetic field at A due to the conduction current is the same as that at B due to the displacement current. In (b), points P and Q are each a distance $r < R$ away from the center line. Compared with the magnetic field at P, that at Q is



1. bigger.
2. smaller.
3. the same.
4. need more information.

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1. bigger.
2. smaller.
3. the same.
4. need more information.

Answer: 2. The magnetic field at P is proportional to the entire conduction current, as can be seen by drawing an amperian loop of radius r through P. At Q, however, only a fraction r^2/R^2 of the changing electric flux, and hence of the displacement current, contributes to the magnetic field. Thus, the magnetic field at Q will be smaller than that at A.