



Corporate Office : Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

## CONCEPT STRENGTHENING SHEET

### CSS-01

### PHYSICS

#### AIATS 01 – CF+OYM - Q.No.-31

**Topic:** Temperature Dependence of Resistivity

31. The material whose resistivity is less sensitive to temperature is

- (1) Silicon (2) Copper  
(3) Silver (4) Nichrome

Scan/Click



Solution



Underlying Concept

1. Consider the following statements and choose the correct option

- (I) Manganin is a material whose resistivity is less sensitive to temperature.  
(II) In general, silicon have less dependence on temperature

- (1) Only (I) is correct  
(2) Only (II) is correct  
(3) Both (I) and (II) are correct  
(4) Both (I) and (II) are incorrect

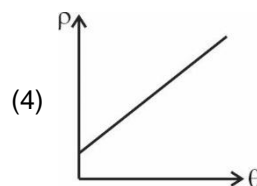
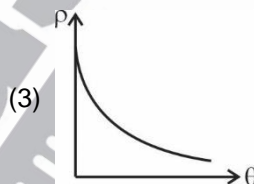
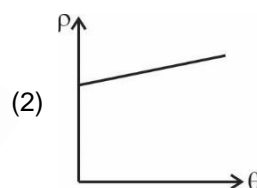
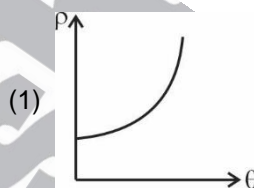
2. Which of the following statements is correct?

- (1) Conductivity of metals decreases with increase in temperature  
(2) Conductivity of semiconductor increases with increase in temperature  
(3) Conductivity of insulators increases slightly with increase in temperature  
(4) All of these

3. Which of the following material is an alloy?

- (1) Nichrome (2) Copper  
(3) Mercury (4) Silicon

4. Variation of resistivity ( $\rho$ ) with temperature ( $\theta$ ) for alloys like Nichrome and manganin is best represented by



#### AIATS 01 – CF+OYM - Q.No.-5

**Topic:** Gauss's Law

5. A solid spherical conductor of radius  $R$  has a spherical cavity of radius  $a$  ( $a < R$ ) at its centre. A charge  $+Q$  is kept at the centre. The charge inside a gaussian surface of radius  $r$  ( $a < r < R$ ) will be

- (1) Zero (2)  $-Q$   
(3)  $+Q$  (4)  $\frac{+Q}{2}$

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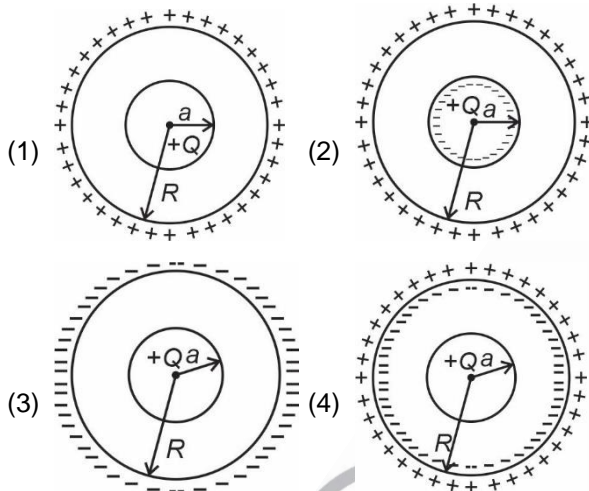


Solution



Underlying Concept

1. A solid spherical conductor of radius  $R$  has a concentric spherical cavity of radius  $a$  ( $a < R$ ). A charge  $+Q$  is kept at the centre. Based upon the above information choose the option with most appropriate distribution of induced charges.



2. A solid spherical conductor of radius  $R$  has a concentric spherical cavity of radius  $a$  ( $a < R$ ). A charge  $+Q$  is kept at the centre. The electric flux through the Gaussian surface of radius  $r$  ( $a < r < R$ ) is

- (1) Zero (2)  $\frac{Q}{2\epsilon_0}$   
(3)  $\frac{Q}{\epsilon_0}$  (4)  $\frac{Q}{4\epsilon_0}$

3. A solid spherical conductor of radius  $R$  has a concentric spherical cavity of radius  $a$  ( $a < R$ ). A charge  $+Q$  is placed inside the spherical cavity. The charge distribution on inner surface of cavity is

- (1) Uniform (2) Non-uniform  
(3) May be (1) or (2) (4) No charge appears

4. A solid spherical conductor of radius  $R$  has a concentric spherical cavity of radius  $a$  ( $a < R$ ). A charge  $+Q$  is kept at the centre. The charge inside a Gaussian surface of radius  $r$  is (where  $r = 2R$ )

- (1)  $+Q$  (2)  $-Q$   
(3) Zero (4)  $+\frac{Q}{2}$

### AIATS 01 – CF+OYM - Q.No.-26

**Topic:** Combination of Resistors - Series and Parallel

26. Two metal wires of identical dimensions are connected in series. If  $\sigma$  and  $2\sigma$  are the conductivities of the metal wire respectively, the effective conductivity of the combination is

- (1)  $\frac{4\sigma}{3}$  (2)  $\frac{2\sigma}{3}$   
(3)  $\frac{\sigma}{3}$  (4)  $3\sigma$

Scan/Click



Solution

1. Two metal wires of identical dimensions are connected in parallel. If  $\sigma$  &  $3\sigma$  are the conductivities of the metal wire respectively, the effective conductivity of combination is

- (1)  $\sigma$  (2)  $4\sigma$   
(3)  $8\sigma$  (4)  $2\sigma$

2. If two wires identical in dimensions are connected in parallel having  $\rho$  &  $2\rho$  as resistivities respectively, then effective resistivity of combination is

- (1)  $\frac{\rho}{2}$  (2)  $\frac{\rho}{4}$   
(3)  $\frac{\rho}{3}$  (4)  $\frac{4\rho}{3}$

3. Two metal wires of identical dimensions are connected in series. If  $\sigma$  and  $4\sigma$  are the conductivities of the metal wire respectively, the ratio of effective resistance to resistance of wire with conductivity  $4\sigma$  is

- (1) 5 : 1 (2) 2 : 5  
(3) 3 : 7 (4) 3 : 5

4. If the resistivity of two wires identical in dimensions are  $\rho$  and  $3\rho$  respectively are connected in series. The effective resistivity of combination, is

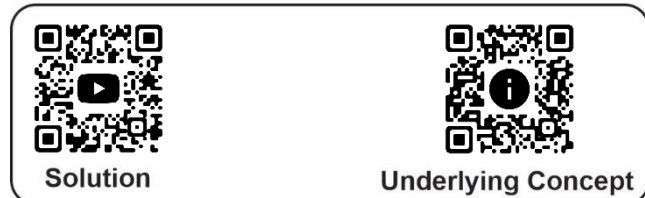
- (1)  $2\rho$  (2)  $4\rho$   
(2)  $5\rho$  (4)  $3\rho$

## AIATS 01 – CF+OYM - Q.No.-3

**Topic:** Electric Field Due to a System of Charges

3. A point charge is brought in an electric field. The electric field at a nearby point
- (1) Will increase if the charge is positive
  - (2) Will decrease if the charge is negative
  - (3) May increase if the charge is positive
  - (4) Will remains same

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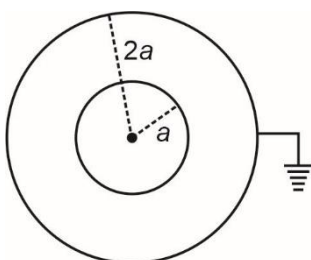


1. A positive point charge is brought in an electric field induced due to a negative charge. The electric field at a nearby point
  - (1) Will increase
  - (2) Will decrease
  - (3) May increase or decrease
  - (4) Remains constant
2. A positive point charge is brought in an electric field induced due to a positive charge. The electric field at a nearby point
  - (1) Will increase
  - (2) Will decrease
  - (3) May increase or decrease
  - (4) Remains constant
3. A positive point charge is brought is an electric field. The electric field at any point
  - (1) Must increase
  - (2) May increase or decrease
  - (3) Must decrease
  - (4) Remains same

## AIATS 01 – CF+OYM - Q.No.-13

**Topic:** Capacitors and Capacitance

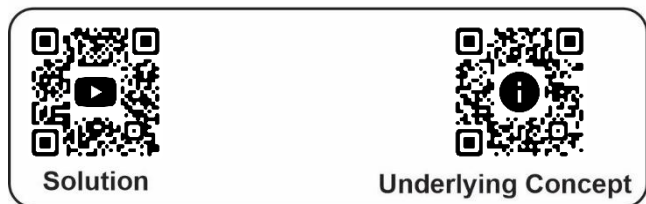
13. Two concentric conducting spherical shells having radii  $a$  and  $2a$  respectively are arranged as shown in the figure



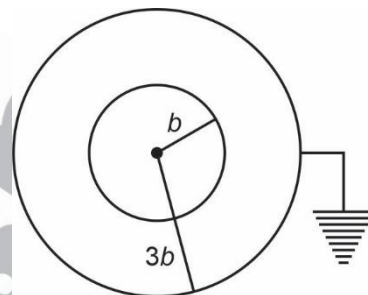
Capacitance of this system is

- (1)  $4\pi\epsilon_0 a$
- (2)  $2\pi\epsilon_0 a$
- (3)  $8\pi\epsilon_0 a$
- (4) Zero

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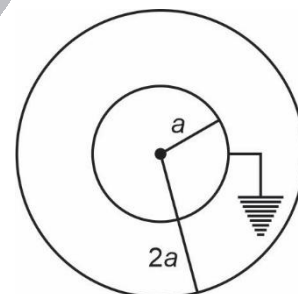


1. Two concentric conducting spherical shells having radii  $b$  and  $3b$  respectively are arranged as shown in the figure. Capacitance of this system is



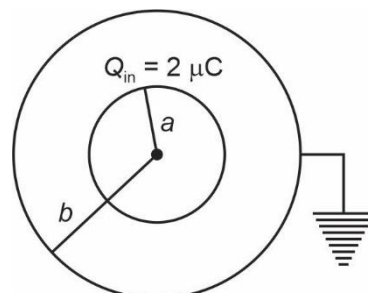
- (1)  $4\pi\epsilon_0 b$
- (2)  $6\pi\epsilon_0 b$
- (3)  $2\pi\epsilon_0 b$
- (4)  $8\pi\epsilon_0 b$

2. When inner sphere is grounded for a system of two concentric conducting spherical shells having radii  $a$  and  $2a$  shown in figure then capacitance of system is



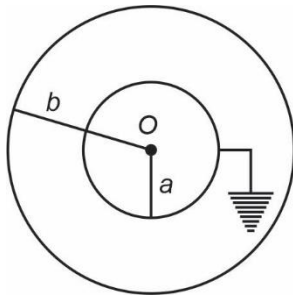
- (1)  $16\pi\epsilon_0 a$
- (2)  $2\pi\epsilon_0 a$
- (3)  $4\pi\epsilon_0 a$
- (4)  $7\pi\epsilon_0 a$

3. Two concentric conducting spherical shells of inner radius  $2\text{ mm}$  and outer radius  $4\text{ mm}$  are arranged as shown in figure. The value of potential for inner sphere is



- (1)  $2.25 \times 10^{-6}\text{ V}$
- (2)  $4.5 \times 10^6\text{ V}$
- (3)  $2.25 \times 10^6\text{ V}$
- (4)  $4.5 \times 10^{-6}\text{ V}$

4. The capacitance of spherical capacitor whose inner sphere is earthed is  $0.4 \mu\text{F}$ . If separation between inner and outer sphere is 2 mm, then the outer radius is



- (1) 0.26 m                      (2) 2.68 m  
(3) 0.34 mm                  (4) 3.4 m

### AIATS 01 – CF+OYM - Q.No.-33

**Topic:** Current Density and Electric Field

33. The amount of charge flowing per second per unit area normal to flow, is called
- (1) Electrical conductivity
  - (2) Current density
  - (3) Electrical resistivity
  - (4) Mobility

Scan/Click



Solution



Underlying Concept

1. If  $I$  is electric current crossing normally through an area  $A$ , then current density will be

- (1)  $\frac{I^2}{A}$                               (2)  $IA$   
(3)  $I^2A$                             (4)  $\frac{I}{A}$

2. Consider the following statements and choose the correct option

- I. Electron mobility of electrons inside a conductor is defined as drift speed acquired per unit applied electric field.
- II. Current density is the ratio of drift speed of electrons and area of cross section of the conductor.

- (1) Only (I) is correct  
(2) Only (II) is correct  
(3) Both (I) and (II) are correct  
(4) Both (I) and (II) are incorrect

3. Choose the correct expression (symbols have their usual meanings)

- (1) Electron mobility =  $\frac{E}{v_d}$   
(2) Current density =  $\frac{A}{I}$   
(3) Electrical conductivity =  $\frac{j}{E}$   
(4) Electric current =  $\frac{q}{At}$



CF + OYM

Based on  
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**Topic:** Temperature Dependence of Resistivity

1. (1)
2. (4)
3. (1)
4. (2)

#### AIATS 01 – CF+OYM - Q.No.-5

**Topic:** Gauss's Law

1. (2)
2. (1)
3. (3)
4. (1)

#### AIATS 01 – CF+OYM - Q.No.-26

**Topic:** Combination of Resistors - Series and Parallel

1. (4)
2. (4)
3. (1)
4. (1)

#### AIATS 01 – CF+OYM - Q.No.-3

**Topic:** Electric Field Due to a System of Charges

1. (3)
2. (3)
3. (2)

#### AIATS 01 – CF+OYM - Q.No.-13

**Topic:** Capacitors and Capacitance

1. (2)
2. (1)
3. (2)
4. (2)

#### AIATS 01 – CF+OYM - Q.No.-33

**Topic:** Current Density and Electric Field

1. (4)
2. (1)
3. (3)

