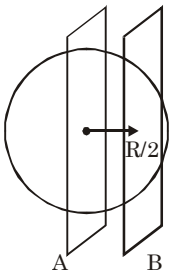
CLASS TEST

PHYSICS | CLASS TEST # 30

SECTION-I

Single Correct Answer Type **5 Q. [3 M (–1)]**

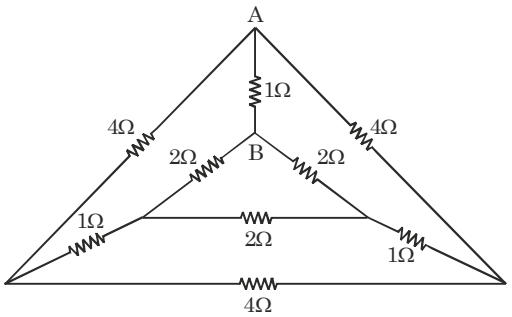
1. From a sphere of electrical conductivity K two planes cut a piece such that first plane passes through the centre of sphere and second parallel to first one at distance R/2 from centre then resistance between A and B.



(A) $\frac{1}{\pi KR}$ (B) $\frac{\sqrt{3}}{\pi KR}$

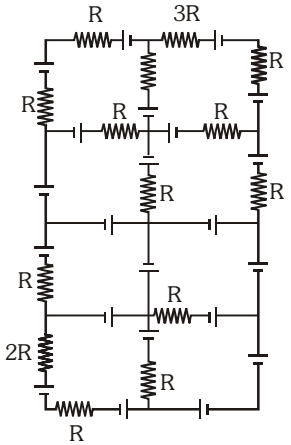
(C) $\frac{\ell n3}{2\pi KR}$ (D) None

2. Consider the circuit as shown in figure. The equivalent resistance between A and B is



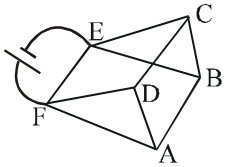
(A) $\frac{9}{7}\Omega$ (B) $\frac{1}{9}\Omega$ (C) $\frac{7}{9}\Omega$ (D) None

3. In the shown circuit all batteries have equal emf E. Current through the 2R resistance is



(A) $\frac{3E}{2R}$ (B) $\frac{2E}{3R}$ (C) $\frac{E}{3R}$ (D) zero

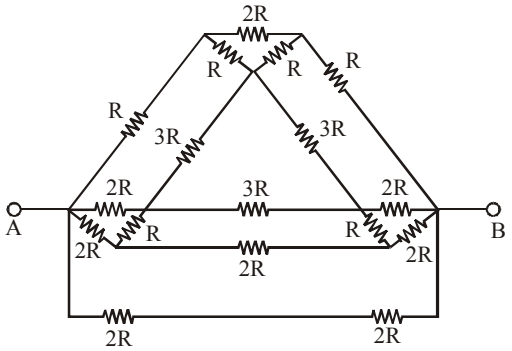
4. A prism is made of wire mesh with each side having equal resistance R. A battery of 6 volt and zero resistance is connected across E and F as shown in the figure. The current in the branch AB, if R is equal to 5Ω, is :-



(A) 0.6 A (B) 0.8 A

(C) 0.4 A (D) 2A

5. Find equivalent resistance between A & B.



(A) $\frac{R}{11}$ (B) $\frac{12R}{11}$ (C) R (D) 4R

Multiple Correct Answer Type 4 Q. [4 M (–1)]

6. A metal sphere of radius a is surrounded by a concentric metal sphere of inner radius of b, where b > a. The space between the spheres is filled with a material whose electrical conductivity σ varies with the electric field strength E as $\sigma = kE$ where k is a constant. A potential difference V is maintained between spheres.

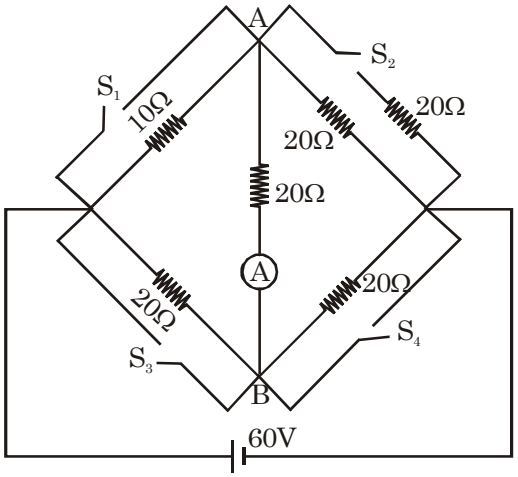
(A) For $a < r < b$, current is $4\pi r^2 kE^2$

(B) For $a < r < b$, current is $2\pi r^2 kE^2$

(C) Potential difference between spheres is $V = \sqrt{\frac{I}{4\pi k}}\ell n\left(\frac{b}{a}\right)$ where I is total current

(D) Potential difference between spheres is $V = \sqrt{\frac{I}{2\pi k}}\ell n\left(\frac{b}{a}\right)$ where I is total current

7. Consider the circuit shown. Resistance connected between terminal 'A' and 'B' is 20Ω and ammeter is ideal. Then select the **CORRECT** statement :-



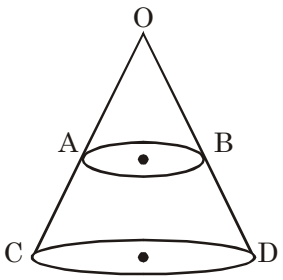
(A) When switch 'S_1' and 'S_4' are closed, current reading of ammeter is 3 amp.

(B) When switch 'S_3' and 'S_2' are closed, current reading of ammeter is $\frac{6}{5}$ amp.

(C) When only 'S_2' is closed, reading of ammeter is zero.

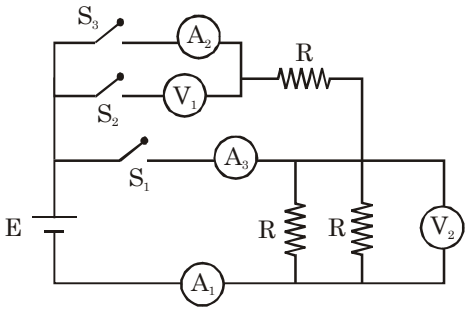
(D) When all the switch are close, reading of ammeter is 0 amp.

8. In given figure AB and CD are diameter of rings such that AB = 10 cm, CD = 20 cm and OA = 10 cm. The resistance per unit length of straight segment is 1Ω/cm and that of rings is $\frac{4}{\pi}$ Ω/cm. A battery of emf 60 V is connected across AB. Select correct alternatives :



(A) Current through AO is 4A
(B) Current through BD is 1.5 A
(C) Potential difference across CD is 30 V
(D) Potential difference across AD is 40 V

9. All ammeter/voltmeter are ideal. Which of the statements are **CORRECT**.

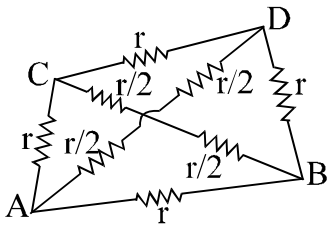


(A) when all switch are closed, reading of A_1 and A_3 are same.
(B) When only S_2 is closed than reading of V_2 is E.
(C) When only S_2, S_3 closed then a reading of A_1 is $\frac{2E}{3R}$
(D) Reading of A_1 is independent of the function of switch S_2.

Linked Comprehension Type (1 Para × 3 Q.) [4 M (–1)]
(Multiple Correct Answer Type)

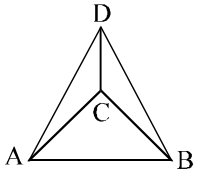
Paragraph for Questions no. 10 to 12

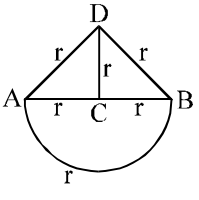
The figure shows a tetrahedron, each side of which has a resistance r

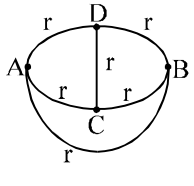


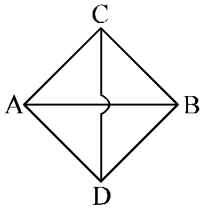
10. Choose the correct statement(s) related to the resistance between any two points.
(A) $R_{AB} = R_{BD} = R_{BC} = R_{CD} = R_{CA} = R_{AD}$
(B) $R_{AB} = R_{AC} = R_{AD} = R_{BD} = R_{BC} \neq R_{CD}$
(C) R_{CD} is the least
(D) $R_{AB} = R_{AC} = R_{BC}$ and $R_{CD} = R_{AD} = R_{BD}$

11. Choose the correct diagram(s), which show two-dimensional equivalent of the tetrahedron.

(A) 

(B) 

(C) 

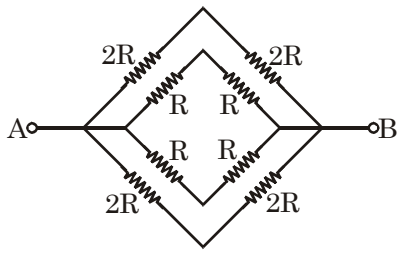
(D) 

12. If a battery is connected between any two points of the tetrahedron, then identify the correct statement(s).
(A) The potentials of the other two points are always equal.
(B) There always exists a branch through which no current flows.
(C) The current coming out of the battery in each case is same.
(D) None of these

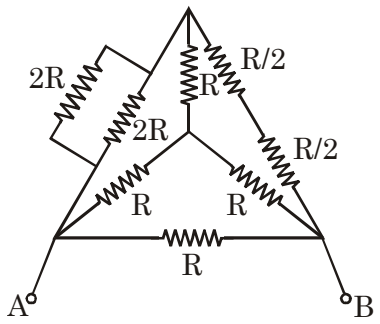
Matching List Type (4 × 4) 2 Q. [3 M (–1)]

13. List-I shows electric circuits and List-II shows equivalent resistance between A and B.

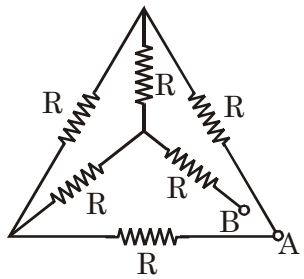
List-I **List-II**

(P) 

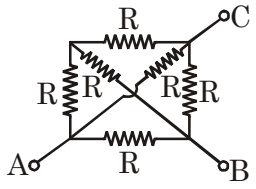
(1) R/2

(Q) 

(2) R/3

(R) 

(3) 2R/3

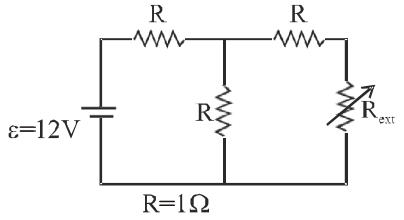
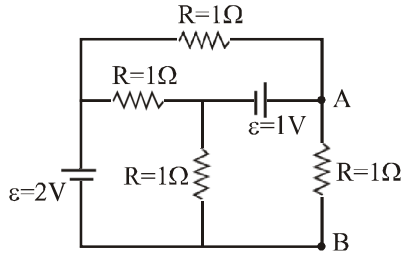
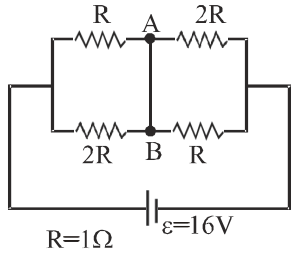
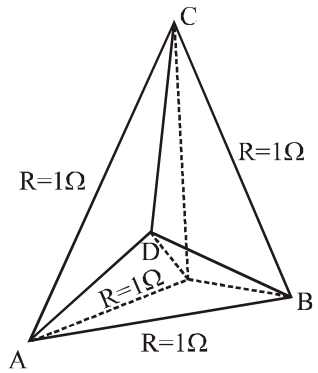
(S) 

(4) 2R

Code

	P	Q	R	S
(A)	3	1	4	2
(B)	2	1	4	2
(C)	3	1	4	1
(D)	2	1	4	3

14. Match the list-I with list-II.

	List-I		**List-II**
(P)	 Numerical value of maximum power (in watt) delivered to R_{ext} is	(1)	$\frac{1}{2}$
(Q)	 Numerical value of potential difference (in volt) between points A & B is	(2)	$\frac{3}{2}$
(R)	 Wire AB has negligible resistance. Numerical value of current (in ampere) through AB is	(3)	6
(S)	 Resistances are arranged in tetrahedron configuration. All resistance are equal. Numerical value of equivalent resistance (in Ω) between A & B is	(4)	4

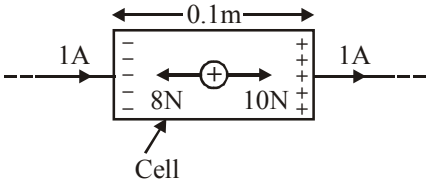
Code

	P	Q	R	S
(A)	4	3	2	1
(B)	3	2	4	1
(C)	1	2	3	4
(D)	2	3	1	4

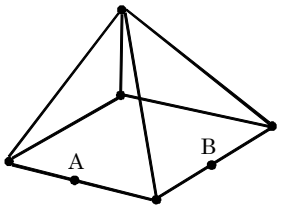
SECTION-III

Numerical Grid Type (Ranging from 0 to 9) **5 Q. [4 M (0)]**

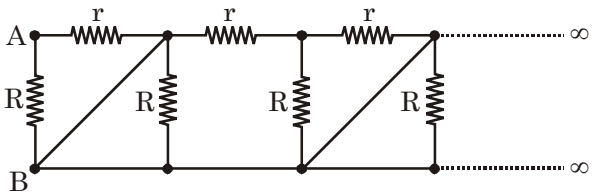
1. Figure shows a cell in which unit positive charge experiences a constant non electric force of 10N and a constant electric force of 8N in directions shown in the figure. The internal resistance of the cell is r Ω. Fill 10r in OMR sheet.



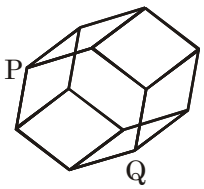
2. A regular pyramid of square is made of eight identical wires each resistance 12 Ω shown in the figure. The terminals A and B are the mid-points of the corresponding sides. Find equivalent resistance between the terminals A and B in ohms.



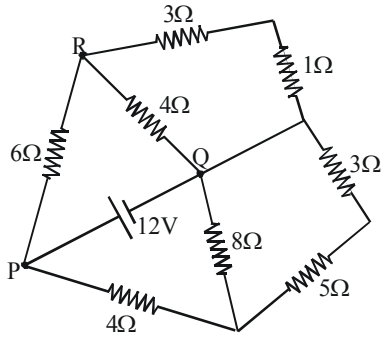
3. Find the equivalent resistance between the terminals A and B as shown on the diagram below. Put R = 12Ω, r = 6Ω and neglect the resistance of leads.



4. All the wires on the front and the back hexagonal face (of the Skelton hexagonal prism) have resistance R. All the wires along the lines joining the vertices of two hexagons have resistance R. Take $R = \frac{20}{3}\Omega$. The equivalent resistance between P and Q as shown in the figure is ... Ω.



5. Find n if the total power dissipated by the circuit is 6n watts.



CLASS TEST # 30 **ANSWER KEY**

SECTION-I

Single Correct Answer Type **5 Q. [3 M (–1)]**

1. Ans. (C) **2. Ans. (C)** **3. Ans. (D)** **4. Ans. (C)**

5. Ans. (B)

Multiple Correct Answer Type **4 Q. [4 M (–1)]**

6. Ans. (A, C) **7. Ans. (A,B,C,D)** **8. Ans. (B,C)** **9. Ans. (A,C,D)**

Linked Comprehension Type **(1 Para × 3 Q.) [4 M (–1)]**

(Multiple Correct Answer Type)

10. Ans. (A,D) **11. Ans. (A,B,C,D)** **12. Ans. (A,B,C)**

Matching List Type (4 × 4) **2 Q. [3 M (–1)]**

13. Ans. (C) **14. Ans. (B)**

SECTION-III

Numerical Grid Type (Ranging from 0 to 9) **5 Q. [4 M (0)]**

1. Ans. 2 **2. Ans. 8** **3. Ans. 4** **4. Ans. 7**

5. Ans. 6