

2007-2024

Previous Year
Solved Papers



Paper
I & II

SSC-JE

STAFF SELECTION COMMISSION

JUNIOR ENGINEER

ELECTRICAL ENGINEERING



Subjectwise, Chapterwise Objective Solved Questions

English & Hindi Both Language

Key Features

- ✧ SSC-JE 2007 to 2024 All Previous Year Questions with Solutions.
- ✧ Most of the Questions having Either Solution or Explanations.
- ✧ All Questions are Subjectwise and Topicwise.

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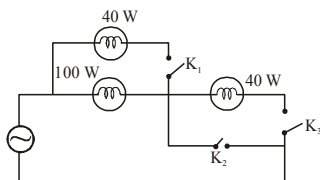
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1. Miscellaneous 882 – 888

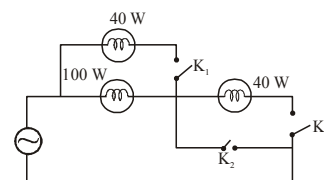
BASICS OF CIRCUIT AND CIRCUIT LAW

1 CHAPTER

- A circuit component that opposes the change in circuit voltage is
(a) Resistance (b) Capacitance
(c) Inductance (d) All the above
[SSC-JE 2008]
- The curve representing Ohm's law is
(a) Linear (b) Hyperbolic
(c) Parabolic (d) Triangular
[SSC-JE 2009]
- Specific resistance of a conductor depends upon
(a) Dimension of the conductor
(b) Composition of conductor material
(c) Resistance of the conductor
(d) Both (a) and (b)
[SSC-JE 2009]
- The ratio of resistances of a 100 W, 220 V lamp to that of a 100 W, 110 V lamp will be at respective voltages
(a) 4 (b) 2 (c) $\frac{1}{2}$ (d) $\frac{1}{4}$
[SSC-JE 2010]
- If four 10 μF capacitors are connected in parallel, the net capacitance is
(a) 2.5 μF (b) 40 μF (c) 20 μF (d) 15 μF
[SSC-JE 2010]
- Permeance is analogous to
(a) Conductance (b) Reluctance
(c) Inductance (d) Resistance
[SSC-JE 2010]
- A wire has a resistance 10 Ω . It is stretched by one-tenth of its original length. Then its resistance will be
(a) 10 Ω (b) 12.1 Ω (c) 9 Ω (d) 11 Ω
[SSC-JE 2010]
- Three lamps are in circuit as shown in figure. At what condition 100 W lamp will have the maximum brightness?
- परिपथ वोल्टता में परिवर्तन का विरोध करने वाला परिपथ का घटक है—
(a) प्रतिरोध (b) धारिता
(c) प्रेरकत्व (d) उपर्युक्त सभी
[SSC-JE 2008]
- ओम नियम को प्रदर्शित करने वाला वक्र है—
(a) रैखिक (b) अतिपरवलयिक
(c) परवलयिक (d) त्रिकोणीय
[SSC-JE 2009]
- किसी चालक का विशिष्ट प्रतिरोध निर्भर करता है—
(a) चालक की विमा पर
(b) चालक पदार्थ के संघटन पर
(c) चालक के प्रतिरोध पर
(d) (a) और (b) दोनों पर
[SSC-JE 2009]
- एक 100 W, 220 V लैंप के प्रतिरोध का 100 W, 110 V लैंप के प्रतिरोध के साथ अपनी-अपनी वोल्टताओं पर अनुपात होगा—
(a) 4 (b) 2 (c) $\frac{1}{2}$ (d) $\frac{1}{4}$
[SSC-JE 2010]
- यदि चार 10 μF संधारित्र पार्श्व में जोड़े जाएँ तो परिणामी धारिता होती है—
(a) 2.5 μF (b) 40 μF (c) 20 μF (d) 15 μF
[SSC-JE 2010]
- चुंबकव्याप्यता अनुरूप है—
(a) चालकत्व के (b) प्रतिष्ठंभ के
(c) प्रेरकत्व के (d) प्रतिरोध के
[SSC-JE 2010]
- एक तार का प्रतिरोध 10 Ω है। उसे तान कर उसकी मूल लंबाई का दसवाँ भाग बढ़ाया गया है। तो उसका प्रतिरोध होगा—
(a) 10 Ω (b) 12.1 Ω (c) 9 Ω (d) 11 Ω
[SSC-JE 2010]
- तीन लैंप, रेखाचित्र में दिए गए परिपथ के अनुसार लगाए गए हैं। तदनुसार 100 W के लैंप में अधिकतम रोशनी कब होगी?

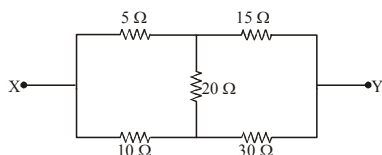


- Key K_1 is open, K_2 is closed and K_3 is open
 - K_1 is closed, K_2 is open and K_3 is also open
 - Both (a) and (d)
 - Key K_1 is closed, K_2 is open and K_3 is closed
- [SSC-JE 2012]



- K_1 की चाबी खुली हो, K_2 की बंद हो तथा K_3 की खुली हो।
 - K_1 की चाबी बंद हो, K_2 की खुली हो तथा K_3 की भी खुली हो।
 - (a) तथा (d) दोनों स्थितियाँ हों।
 - K_1 की चाबी बंद हो, K_2 की खुली हो तथा K_3 की बंद हो।
- [SSC-JE 2012]

9. The equivalent resistance between terminals X and Y of the network shown is



- (a) $\frac{20}{9} \Omega$ (b) 8Ω (c) $\frac{100}{3} \Omega$ (d) $\frac{40}{3} \Omega$

[SSC-JE 2012]

10. Three resistance 5Ω each are connected in star. Values of equivalent delta resistance are

- (a) 15Ω each (b) 1.5Ω each
(c) 2.5Ω each (d) $5/3 \Omega$ each

[SSC-JE 2012]

11. Which of the following materials possess the least resistivity?

- (a) Copper (b) Iron (c) Maganin (d) Aluminium

[SSC-JE 2012]

12. A $10 \mu\text{F}$ and a $20 \mu\text{F}$ capacitor are in series. The combination is supplied at 150 V from a sinusoidal voltage source. The voltage across the $20 \mu\text{F}$ capacitor is then

- (a) 50 V (b) 75 V (c) 125 V (d) 100 V

[SSC-JE 2012]

13. Which of the following is the best conductor of electricity?

- (a) Distilled water (b) Warm water
(c) Salt water (d) Cold water

[SSC-JE 2012]

14. SI unit of Electrical Energy is

- (a) Volt-Ampere-Second (b) Watt-Second
(c) Joule (d) kWh

[SSC-JE 2012]

15. A 20 micro farad capacitor is connected across an ideal voltage source. The current in the capacitor

- (a) will be very high at first, then exponentially decay.
(b) will be very high at first, then exponentially decay and at steady state will become zero
(c) None of these are true
(d) will be zero at first, then exponentially rise

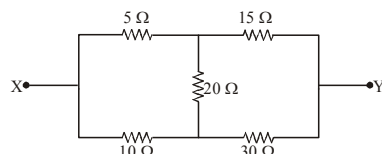
[SSC-JE 2012]

16. A balanced 3-phase, 3-wire supply feeds balanced star connected resistors. If one of the resistor is disconnected, then the percentage reduction in load will be

- (a) 33.33 (b) 50 (c) 66.67 (d) 75

[SSC-JE 2013]

9. चित्र में प्रदर्शित नेटवर्क का X तथा Y टर्मिनलों के बीच तुल्यमान प्रतिरोध कितना होगा?



- (a) $\frac{20}{9} \Omega$ (b) 8Ω (c) $\frac{100}{3} \Omega$ (d) $\frac{40}{3} \Omega$

[SSC-JE 2012]

10. तीन प्रतिरोध, जिनमें प्रत्येक 5Ω है, स्टार में जोड़े गए हैं। तदनुसार उनके अनुरूप डेल्टा-प्रतिरोधों का मान कितना होगा?

- (a) 15Ω प्रत्येक (b) 1.5Ω प्रत्येक
(c) 2.5Ω प्रत्येक (d) $5/3 \Omega$ प्रत्येक

[SSC-JE 2012]

11. निम्न पदार्थों में, किसमें सबसे कम प्रतिरोधकता होती है?

- (a) तांबा (b) लोहा (c) मैंगनिन (d) ऐलुमिनियम

[SSC-JE 2012]

12. एक $10 \mu\text{F}$ तथा एक $20 \mu\text{F}$ के संधारित्र श्रेणीबद्ध हैं। उनके संयोजन में 150 V , एक ज्यावक्रीय वोल्टता-स्रोत से दिए जाते हैं। तदनुसार $20 \mu\text{F}$ के संधारित्र के संपर्क में कितनी वोल्टता रहेगी?

- (a) 50 V (b) 75 V (c) 125 V (d) 100 V

[SSC-JE 2013]

13. निम्न में कौन, विद्युत का सर्वोत्तम चालक है?

- (a) आसवित जल (b) गर्म जल
(c) नमक जल (d) शीतल जल

[SSC-JE 2012]

14. विद्युत ऊर्जा की SI इकाई कौन सी है?

- (a) वोल्ट-ऐम्पियर-सेकंड (b) वाट-सेकंड
(c) जूल (d) kWh

[SSC-JE 2012]

15. एक $20 \text{ माइक्रो फॅराडे}$ संधारित्र को एक आदर्श वोल्टता स्रोत के संपर्क में जोड़ दिया जाता है। तदनुसार संधारित्र की धारा कितनी हो जाएगी?

- (a) पहले अत्यधिक होगी, अनंतर चरघातांकी ढंग से घटेगी
(b) पहले अत्यधिक होगी, अनंतर चरघातांकी ढंग से घटेगी और स्थिर अवस्था में शून्य हो जाएगी।
(c) इनमें कोई सच नहीं है।
(d) पहले शून्य होगी, अनंतर चरघातांकी ढंग से बढ़ेगी।

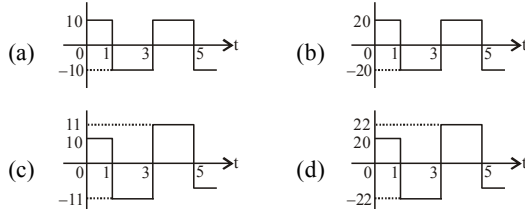
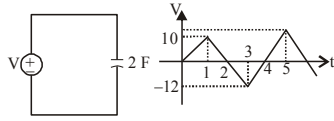
[SSC-JE 2012]

16. एक संतुलित 3-कला, 3-तार आपूर्ति संतुलित तारा बंधित प्रतिरोधकों को भरण करती है। यदि एक प्रतिरोधक को वियोजित कर दिया जाए, तो भार में प्रतिशत कमी होगी

- (a) 33.33 (b) 50 (c) 66.67 (d) 75

[SSC-JE 2013]

17. In the circuit, V is the input voltage applied across the capacitor of 2 F . Current through the capacitor is



[SSC-JE 2013]

18. Ampere-second is the unit of

- (a) emf (b) power
(c) electric charge (d) energy

[SSC-JE 2013]

19. Two lossy capacitors with equal capacitance values and power factors of 0.01 and 0.02 are in parallel, and the combination is supplied from a sinusoidal voltage source. The power factor of the combination is

- (a) 0.03 (b) 0.015 (c) 0.01 (d) 0.0002

[SSC-JE 2013]

20. Two 2000Ω , 2 watt resistors are connected in parallel. Their combined resistance value and wattage rating are

- (a) 1000Ω , 2 watt (b) 1000Ω , 4 watt
(c) 2000Ω , 4 watt (d) 2000Ω , 2 watt

[SSC-JE 2013]

21. We have three resistance each of value 1Ω , 2Ω , and 3Ω . If all the three resistance are to be connected in a circuit, how many different values of equivalent resistance are possible?

- (a) Five (b) Six (c) Seven (d) Eight

[SSC-JE 2013]

22. Three $3\mu\text{F}$ capacitors are in series. A $6\mu\text{F}$ capacitor is in parallel with this series arrangement. the equivalent capacitance of this combination is

- (a) $7\mu\text{F}$ (b) $15\mu\text{F}$ (c) $3.6\mu\text{F}$ (d) $1\mu\text{F}$

[SSC-JE 2013]

23. Three inductors each of 60 mH are connected in delta. The value of inductance of each arm of the equivalent star connection is

- (a) 10 mH (b) 15 mH (c) 20 mH (d) 30 mH

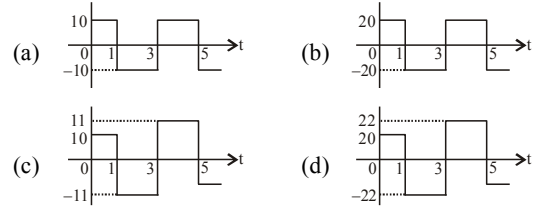
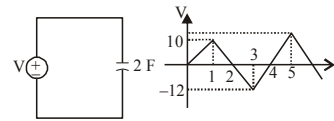
[SSC-JE 2013]

24. A voltage source having an open-circuit voltage of 150 V and internal resistance of 75Ω , is equivalent to a current source of

- (a) 2 A in series with 75Ω
(b) 2 A in parallel with 37.5Ω
(c) 2 A in parallel with 75Ω
(d) 1 A in parallel with 150Ω

[SSC-JE 2013]

17. परिपथ में, 2 F के संधारित्र के गिर्द निवेश वोल्टता V प्रयुक्त की गई है। संधारित्र से गुजरने वाली धारा है



[SSC-JE 2013]

18. ऐम्पियर-सेकण्ड किसकी इकाई है?

- (a) वि.वा.बल (emf) (b) शक्ति
(c) विद्युत आवेश (d) ऊर्जा

[SSC-JE 2013]

19. बराबर धारिता मानों और 0.01 तथा 0.02 के शक्ति गुणकों वाले दो क्षययुक्त संधारित्र पार्श्व में है और संयोजन की पूर्ति एक ज्यावक्रीय वोल्टता स्रोत से की जाती है। संयोजन का शक्ति गुणक है

- (a) 0.03 (b) 0.015 (c) 0.01 (d) 0.0002

[SSC-JE 2013]

20. दो 2000Ω , 2 वाट प्रतिरोधक पार्श्व में संयोजित किए गए हैं। उनका संयुक्त प्रतिरोध मान और वाटेज दर हैं

- (a) 1000Ω , 2 वाट (b) 1000Ω , 4 वाट
(c) 2000Ω , 4 वाट (d) 2000Ω , 2 वाट

[SSC-JE 2013]

21. हमारे पास तीन प्रतिरोध हैं जिनका मान 1Ω , 2Ω और 3Ω है। यदि तीनों प्रतिरोधों को एक परिपथ में संयोजित करना हो, तो तुल्य प्रतिरोध के कितने भिन्न मान संभव हैं?

- (a) पाँच (b) छह (c) सात (d) आठ

[SSC-JE 2013]

22. तीन $3\mu\text{F}$ संधारित्र श्रेणी में हैं। इस श्रेणी व्यवस्था के साथ एक $6\mu\text{F}$ संधारित्र पार्श्व में है। इस संयोजन की तुल्य धारिता है

- (a) $7\mu\text{F}$ (b) $15\mu\text{F}$
(c) $3.6\mu\text{F}$ (d) $1\mu\text{F}$

[SSC-JE 2013]

23. तीन प्रेरक, जिनमें प्रत्येक 60 mH का है, त्रिभुज (डेल्टा में) जोड़े गए हैं। तदनुसार, उन्ही जैसों के आकार में जोड़ने पर प्रत्येक भुजा का प्रेरकत्व में कितना होगा?

- (a) 10 mH (b) 15 mH (c) 20 mH (d) 30 mH

[SSC-JE 2013]

24. एक वोल्टता स्रोत जिसमें 150 V वोल्टता का खुला-परिपथ और 75Ω का आंतरिक प्रतिरोध है, कितने मान की धारा-स्रोत के बराबर होगा?

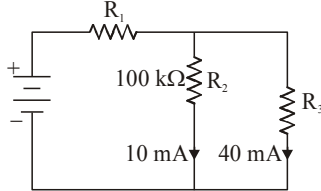
- (a) 75Ω के साथ श्रेणी में, 2 A
(b) 37.5Ω के साथ समांतर, 2 A
(c) 75Ω के साथ समांतर, 2 A
(d) 150Ω के साथ समांतर, 1 A

[SSC-JE 2013]

33. Two electric bulbs have tungsten filament of same thickness. If one of them gives 60 W and the other give 100 W, then
- 60 W and 100 W lamp filaments have equal length
 - 60 W lamp filament has shorter length
 - 100 W lamp filament has longer length
 - 60 W lamp filament has longer length

[SSC-JE 2014 (M)]

34. Find R_3 for the circuit shown in figure:



- 25 mega ohm
- 25 milli ohm
- 25 ohm
- 25 kilo ohm

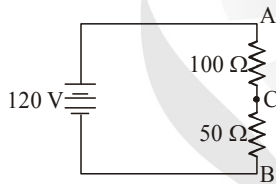
[SSC-JE 2014 (M)]

35. An ideal voltage source should have:

- infinite source resistance
- large value of emf
- small value of emf
- zero source resistance

[SSC-JE 2014 (M)]

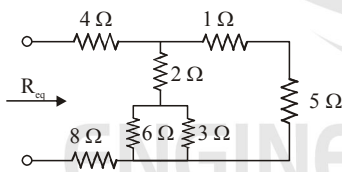
36. Determine the voltage at point C shown below with respect to ground:



- 80 V
- 120 V
- 40 V
- 71 V

[SSC-JE 2014 (M)]

37. The R_{eq} for the circuit shown in figure is



- 14.4 Ω
- 14.57 Ω
- 15.27 Ω
- 15.88 Ω

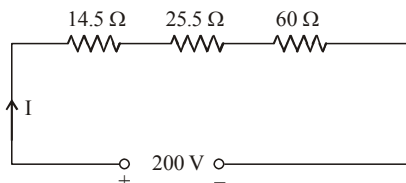
[SSC-JE 2014 (E)]

38. The SI unit of conductivity is

- ohm-m
- ohm/m
- mho-m
- mho/m

[SSC-JE 2014 (E)]

39. Calculate the voltage drop across 14.5 Ω resistance



- 14.5 V
- 18 V
- 29 V
- 30.5 V

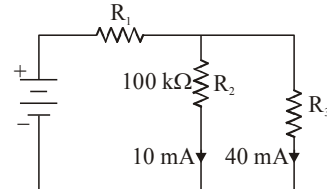
[SSC-JE 2014 (E)]

33. दो विद्युत बल्बों में समान मोटाई के टंगस्टन फिलामेंट है। यदि उनमें से एक 60 W देता है और दूसरा 100 W तो:

- 60 W और 100 W लैम्प फिलामेंट बराबर लंबाई के हैं।
- 60 W लैम्प फिलामेंट कम लंबाई का है।
- 100 W लैम्प फिलामेंट अधिक लंबाई का है।
- 60 W लैम्प फिलामेंट अधिक लंबाई का है।

[SSC-JE 2014 (M)]

34. आकृति में दर्शाए गए परिपथ के लिए R_3 ज्ञात कीजिए?



- 25 mega ohm
- 25 milli ohm
- 25 ohm
- 25 kilo ohm

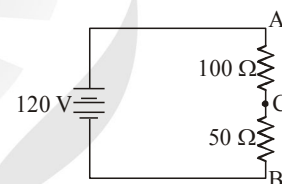
[SSC-JE 2014 (M)]

35. एक आदर्श वोल्टेज स्रोत में क्या होना चाहिए?

- अपरिमित स्रोत प्रतिरोध
- विद्युत वाहक बल का बृहत् मान
- विद्युत वाहक बल का लघु मान
- शून्य स्रोत प्रतिरोध

[SSC-JE 2014 (M)]

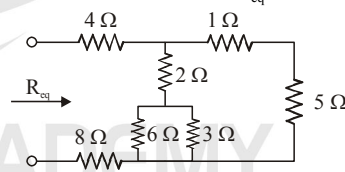
36. भू संपर्कन के संबंध में, नीचे दर्शाए गए C बिंदु पर वोल्टेज ज्ञात कीजिए।



- 80 V
- 120 V
- 40 V
- 71 V

[SSC-JE 2014 (M)]

37. आकृति में दर्शाए गए परिपथ के लिए R_{eq} कितना है?



- 14.4 Ω
- 14.57 Ω
- 15.27 Ω
- 15.88 Ω

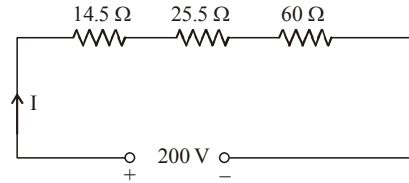
[SSC-JE 2014 (E)]

38. चालकता SI यूनिट क्या है?

- ohm-m
- ohm/m
- mho-m
- mho/m

[SSC-JE 2014 (E)]

39. 14.5 Ω प्रतिरोध पर वोल्टेज ड्रॉप (वोल्टता पात) का परिकलन कीजिए?



- 14.5 V
- 18 V
- 29 V
- 30.5 V

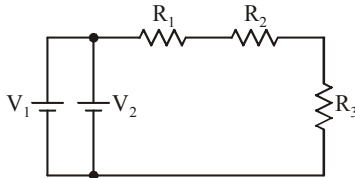
[SSC-JE 2014 (E)]

82. When a dielectric is placed in an electric field, the field strength ____.

(a) Increases (b) Decreases
(c) Remain unchanged (d) Reduces to zero

[SSC-JE 02.03.2017 (M)]

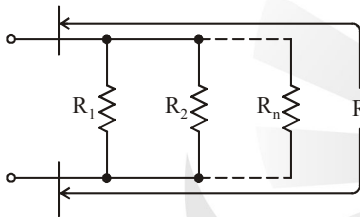
83. Which of the statements about the circuit shown in the figure is true?



(a) The voltage sources V_1 and V_2 are connected in series
(b) The resistances R_1 and R_2 are connected in parallel
(c) The voltage sources V_1 and V_2 are connected in parallel
(d) The resistance R_1 , R_2 and R_3 are connected in parallel

[SSC-JE 02.03.2017 (M)]

84. Which of the following formula is used to calculate the total resistance R of the circuit shown below ?



(a) $R = (R_1 \times R_2 \times \dots \times R_n) / (R_1 + R_2 + \dots + R_n)$
(b) $R = (1/R_1) + (1/R_2) + \dots + (1/R_n)$
(c) $1/R = (1/R_1) + (1/R_2) + \dots + (1/R_n)$
(d) $R = R_1 + R_2 + \dots + R_n$

[SSC-JE 02.03.2017 (M)]

85. The resistance R_1 and R_2 are connected in parallel. The ratio of values of resistances $R_1 : R_2$ is 4 : 1. The current in $R_1 : R_2$ will be equal to ____.

(a) 4 : 1 (b) 1 : 4 (c) 1 : 1 (d) 4 : 4

[SSC-JE 02.03.2017 (M)]

86. When the plate area of a parallel plate capacitor is increased keeping the capacitor voltage constant, the force between plates ____.

(a) increases (b) decreases
(c) remains constant
(d) may increase or decrease on the metal making up the plates

[SSC-JE 02.03.2017 (M)]

87. Energy stored in a capacitor over a cycle when excited by an a.c. source is ____.

(a) same as that due to a d.c. source at equivalent magnitude
(b) half of that due to a d.c. source at equivalent magnitude
(c) zero
(d) None of these

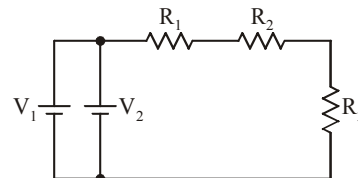
[SSC-JE 02.03.2017 (M)]

82. जब एक डाइइलेक्ट्रिक को विद्युत क्षेत्र में रखा जाता है, तो क्षेत्र तीव्रता _____ है?

(a) बढ़ती (b) घटती
(c) अपरिवर्तित रहती (d) शून्य तक कम हो जाती

[SSC-JE 02.03.2017 (M)]

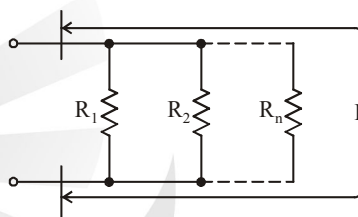
83. दर्शाए गए परिपथ की आकृति में निम्नलिखित में से कौन सा कथन सत्य है?



(a) वोल्टता (वोल्टेज) स्रोत V_1 और V_2 श्रेणी में जुड़े हैं।
(b) प्रतिरोध R_1 और R_2 समानांतर में जुड़े हैं।
(c) वोल्टता (वोल्टेज) स्रोत V_1 और V_2 समानांतर में जुड़े हैं।
(d) प्रतिरोध R_1 , R_2 और R_3 समानांतर में जुड़े हैं।

[SSC-JE 02.03.2017 (M)]

84. नीचे दर्शाए गई परिपथ में कुल प्रतिरोध R की गणना के लिए निम्नलिखित में से किस सूत्र का उपयोग होगा?



(a) $R = (R_1 \times R_2 \times \dots \times R_n) / (R_1 + R_2 + \dots + R_n)$
(b) $R = (1/R_1) + (1/R_2) + \dots + (1/R_n)$
(c) $1/R = (1/R_1) + (1/R_2) + \dots + (1/R_n)$
(d) $R = R_1 + R_2 + \dots + R_n$

[SSC-JE 02.03.2017 (M)]

85. प्रतिरोध R_1 और R_2 समानांतर में जुड़े हैं। प्रतिरोध $R_1 : R_2$ के मान का अनुपात 4 : 1 है। $R_1 : R_2$ में धारा किसके बराबर होगी ?

(a) 4 : 1 (b) 1 : 4
(c) 1 : 1 (d) 4 : 4

[SSC-JE 02.03.2017 (M)]

86. संधारित्र (कैपेसिटर) वोल्टता (वोल्टेज) को स्थिर रखाकर यदि समानांतर प्लेट संधारित्र (कैपेसिटर) के प्लेट क्षेत्रफल को बढ़ाया जाए, तो प्लेटों के बीच बल _____

(a) बढ़ता है। (b) घटता है।
(c) स्थिर रहता है।
(d) निर्मित प्लेट की धातु के अनुसार बढ़ेगी अथवा घटेगी

[SSC-JE 02.03.2017 (M)]

87. एक ए.सी. स्रोत द्वारा उत्तेजित (एकसाइटेड) संधारित्र (कैपेसिटर) के चक्र के लिए संरक्षित ऊर्जा _____ होती है।

(a) समतुल्य परिमाण पर डी.सी. स्रोत द्वारा ऊर्जा के समान
(b) समतुल्य परिमाण पर डी.सी. स्रोत द्वारा ऊर्जा के आधे के बराबर
(c) शून्य
(d) इनमें से कोई नहीं

[SSC-JE 02.03.2017 (M)]

88. Inside a hollow conducting sphere, electric field _____.
 (a) is zero
 (b) is a non-zero constant
 (c) changes with the magnitude of the charge given to the conductor
 (d) changes with distance from the centre of the sphere

[SSC-JE 02.03.2017 (M)]

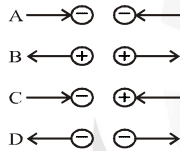
89. The resistance of a strip of copper of rectangular cross section is 2Ω . A metal of resistivity twice that of copper is coated on its upper surface to a thickness equal to that of copper strip. The resistance of composite strip will be _____.
 (a) 6Ω (b) $4/3\Omega$ (c) $3/2\Omega$ (d) $3/4\Omega$

[SSC-JE 02.03.2017 (M)]

90. A six dot mica capacitor color coded, white, red, green, brown, red and yellow has the capacitance value of
 (a) 25 pF (b) 124 pF
 (c) 250 pF (d) 925 pF

[SSC-JE 02.03.2017 (M)]

91. Which of the following pairs of arrows show the wrong direction of the forces between the charges?



- (a) A (b) B (c) C (d) D

[SSC-JE 02.03.2017 (E)]

92. Absorbed moisture contents affect the dielectric strength _____.
 (a) directly (b) indirectly
 (c) does not affect (d) None of these

[SSC-JE 02.03.2017 (E)]

93. What will be the capacity of four capacitors of equal capacity 'C', when connected in series?
 (a) $4C$ (b) $C/4$ (c) C (d) $3/4C$

[SSC-JE 02.03.2017 (E)]

94. Two condensers of capacity $2F$ and $3F$ are connected in series, a third condenser of $1F$ is connected in parallel to them, the resultant capacity in Farad (F) will be _____.
 (a) $6F$ (b) $5/11F$ (c) $5/6F$ (d) $11/5F$

[SSC-JE 02.03.2017 (E)]

95. How will the total capacitance change, when two capacitors are connected in parallel?
 (a) The total capacitance increases
 (b) The total capacitance decreases
 (c) The mean value gives the new capacitance
 (d) The total capacitance is found by reciprocal equation

[SSC-JE 02.03.2017 (E)]

88. खोखले संचालक गोले के भीतर, विद्युत क्षेत्र _____

- (a) शून्य होता है।
 (b) गैर-शून्य स्थिरांक होता है।
 (c) चालक को दिये जाने वाले आवेश के परिमाण के साथ परिवर्तित होता है।
 (d) गोले के केंद्र से दूरी के साथ परिवर्तित होता है।

[SSC-JE 02.03.2017 (M)]

89. तांबे की छड़ के आयताकार अनुप्रस्थ काट का प्रतिरोध 2Ω है। एक धातु, जिसकी प्रतिरोधकता तांबे की प्रतिरोधकता की दोगुनी है, तांबे की छड़ की मोटाई के बराबर इसको ऊपरी सतह पर कोट किया जाता है। संयोजित स्ट्रिप का प्रतिरोध कितना होगा?

- (a) 6Ω (b) $4/3\Omega$
 (c) $3/2\Omega$ (d) $3/4\Omega$

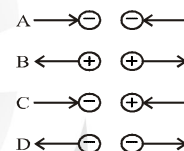
[SSC-JE 02.03.2017 (M)]

90. सफेद, लाल, हरा, भूरा, लाल और पीला रंग से कोडेड एक छः बिंदु वाले अभ्रक संधारित्र (कैपेसिटर) का धारिता (केपेसिटेंस) का मान क्या होगा?

- (a) 25 pF (b) 124 pF (c) 250 pF (d) 925 pF

[SSC-JE 02.03.2017 (M)]

91. निम्नलिखित तीरों के जोड़ों में से कौन सा जोड़ा आवेशों के मध्य बल की गलत दिशा को दर्शाता है?



- (a) A (b) B (c) C (d) D

[SSC-JE 02.03.2017 (E)]

92. अवशोषित आर्द्रता कण, परावैद्युत क्षमता को कैसे प्रभावित करते हैं?

- (a) प्रत्यक्षतः (b) अप्रत्यक्षतः
 (c) प्रभावित नहीं करते (d) इनमें से कोई नहीं

[SSC-JE 02.03.2017 (E)]

93. समान क्षमता (कैपेसिटी) 'C' वाले चार संधारित्र (केपेसिटर) को श्रेणी में जोड़ने पर उनकी कुल क्षमता कितनी होगी ?

- (a) $4C$ (b) $C/4$ (c) C (d) $3/4C$

[SSC-JE 02.03.2017 (E)]

94. क्षमता $2F$ और $3F$ वाले दो संघनित्र (कंडेंसर) श्रेणी में जुड़े हुए हैं। जबकि $1F$ क्षमता वाले एक तीसरे संघनित्र को इसके समानांतर जोड़ा जाता है, तो ज्ञात करें कुल क्षमता (फैरड में) क्या होगी?

- (a) $6F$ (b) $5/11F$ (c) $5/6F$ (d) $11/5F$

[SSC-JE 02.03.2017 (E)]

95. जब दो संधारित्र (कैपेसिटर्स) को समानांतर श्रेणी में जोड़े जाते हैं तो कुल धारिता कैसे परिवर्तित होगी?

- (a) कुल धारिता बढ़ जाएगी।
 (b) कुल धारिता घट जाएगी।
 (c) नई धारिता दोनों के औसत के बराबर होगी।
 (d) व्युत्क्रमानुपातिक समीकरण से कुल धारिता का पता लग जाएगा।

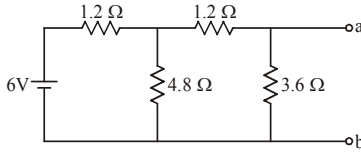
[SSC-JE 02.03.2017 (E)]

103. Static electricity is produced by _____.

- (a) chemical reaction (b) friction
(c) induction (d) both friction and induction

[SSC-JE 02.03.2017 (E)]

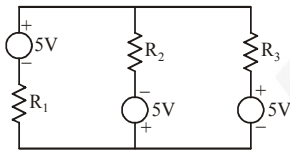
104. The resistance across terminals 'a' and 'b' in the circuit shown will be _____.



- (a) 1.35 Ω (b) 2.45 Ω (c) 6 Ω (d) 10.8 Ω

[SSC-JE 02.03.2017 (E)]

105. The circuit given below can be reduced to single source of _____.



- (a) 15 V in series with R_3 (b) 5 V in series with R_3
(c) 10 V in series with R_2 (d) 15 V in series with R_1

[SSC-JE 02.03.2017 (E)]

106. What is called the electro-motive force (e.m.f) of a voltage source?

- (a) Terminal voltage when load is applied
(b) Internal voltage when no load is applied
(c) Product of internal resistance and load current
(d) Electric pressure provided to the load

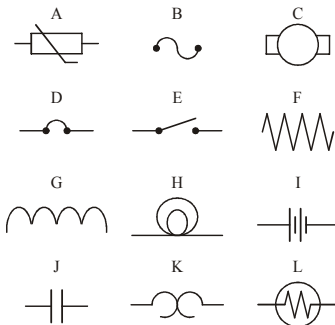
[SSC-JE 02.03.2017 (E)]

107. To neglect a voltage source, the terminals across the source are _____.

- (a) open-circuited
(b) short-circuited
(c) replaced by some resistance
(d) replaced by capacitance

[SSC-JE 02.03.2017 (E)]

108. In the figures given below, which figure is the electrical symbol for a source of energy?



- (a) Figure A (b) Figure B (c) Figure I (d) Figure J

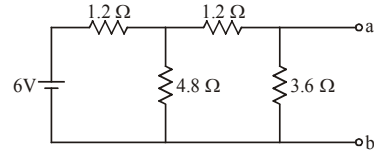
[SSC-JE 02.03.2017 (E)]

103. स्थैतिक बिजली किससे उत्पन्न होती है?

- (a) रासायनिक अभिक्रिया से (b) घर्षण से
(c) प्रेरण (इंडक्शन) से (d) घर्षण और प्रेरण दोनों से

[SSC-JE 02.03.2017 (E)]

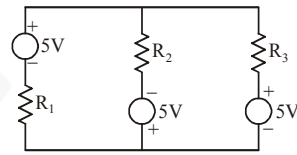
104. दर्शाए गए परिपथ में टर्मिनल 'a' और 'b' का प्रतिरोध कितना होगा?



- (a) 1.35 Ω (b) 2.45 Ω (c) 6 Ω (d) 10.8 Ω

[SSC-JE 02.03.2017 (E)]

105. नीचे दिये परिपथ को _____ एकल स्रोत में छोटा किया जा सकता है।



- (a) R_3 में श्रेणी के साथ 15 V (b) R_3 में श्रेणी के साथ 5 V
(c) R_2 में श्रेणी के साथ 10 V (d) R_1 में श्रेणी के साथ 15 V

[SSC-JE 02.03.2017 (E)]

106. वोल्टता स्रोत का आन्तरिक विद्युत वाही (इलेक्ट्रोमोटिव) बल क्या कहलाता है?

- (a) टर्मिनल वोल्टता, जब लोड (भार) की आपूर्ति हो
(b) आंतरिक वोल्टता, जब लोड की आपूर्ति न की गई हो
(c) आंतरिक प्रतिरोध और लोड धारा का गुणनफल
(d) लोड को प्रदान किया गया विद्युत दाब

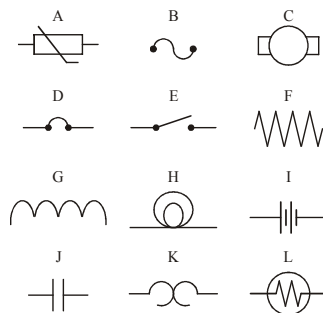
[SSC-JE 02.03.2017 (E)]

107. वोल्टता स्रोत की उपेक्षा के लिए, स्रोत में टर्मिनल _____ होते हैं।

- (a) खुले परिपथ (ओपन सर्किटेड) वाले
(b) लघु परिपथ वाले
(c) किसी प्रतिरोध द्वारा बदल दिए गए
(d) धारिता द्वारा बदल दिए गए

[SSC-JE 02.03.2017 (E)]

108. नीचे दी आकृति में, कौन सी आकृति ऊर्जा के स्रोत का प्रतीक है?



- (a) आकृति A (b) आकृति B (c) आकृति I (d) आकृति J

[SSC-JE 02.03.2017 (E)]

441. A 4Ω resistor has a specified maximum power dissipation of 784 W. Calculate its maximum current level.

- (a) 10 A (b) 14 A (c) 16 A (d) 196 A

[SSC-JE 07.06.2024 (E)]

442. Which of the following factors will NOT affect the selection of an inductor?

- (a) Current rating (b) Dielectric constant
(c) Quality factor (d) Power loss

[SSC-JE 07.06.2024 (E)]

443. In heating effect, if 'I' is the current flowing through the conductor in 't' seconds having a resistance 'R', then the electrical energy supplied is _____.

- (a) I^2R/t joules (b) IR^2t joules
(c) IR^2/t joules (d) I^2Rt joules

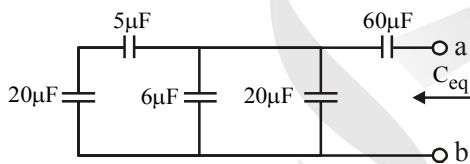
[SSC-JE 07.06.2024 (E)]

444. What type of component in an electrical circuit has to be used to deliver power or process electrical signals?

- (a) Active component (b) Linear component
(c) Passive component (d) Unilateral component

[SSC-JE-MAINS (06.11.2024)]

445. Find the equivalent capacitance ' C_{eq} ' in the following circuit.



- (a) $25\mu F$ (b) $35\mu F$ (c) $30\mu F$ (d) $20\mu F$

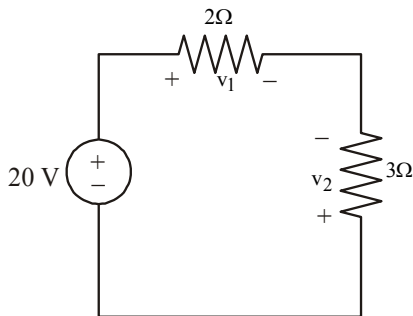
[SSC-JE-MAINS (06.11.2024)]

446. Which of the following is a passive electronic component?

- (a) Operational amplifier (b) Photo diode
(c) Transistor (d) Capacitor

[SSC-JE-MAINS (06.11.2024)]

447. Find the voltage ' V_1 ' in the following circuit.



- (a) 8V (b) 12V (c) -12V (d) -8V

[SSC-JE-MAINS (06.11.2024)]

441. एक 4Ω प्रतिरोधक में 784 W का निर्दिष्ट अधिकतम शक्ति अपव्यय है। इसके अधिकतम धारा स्तर की गणना करें।

- (a) 10 A (b) 14 A (c) 16 A (d) 196 A

[SSC-JE 07.06.2024 (E)]

442. निम्नलिखित में से कौन सा कारक प्रेरक के चयन को प्रभावित नहीं करेगा?

- (a) धारा रेटिंग (b) परावैद्युत स्थिरांक
(c) गुणवत्ता कारक (d) शक्ति की हानि

[SSC-JE 07.06.2024 (E)]

443. तापीय प्रभाव में, प्रतिरोध 'R' वाले चालक के माध्यम से 'I' सेकंड में प्रवाहित होने वाली धारा 'I' है, तो आपूर्ति की गई विद्युत ऊर्जा _____ है।

- (a) I^2R/t joules (b) IR^2t joules
(c) IR^2/t joules (d) I^2Rt joules

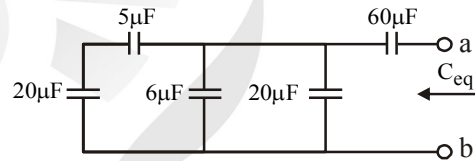
[SSC-JE 07.06.2024 (E)]

444. विद्युत परिपथ में किस प्रकार के घटक का उपयोग शक्ति पहुंचाने या विद्युत संकेतों को संसाधित करने के लिए किया जाना चाहिए?

- (a) सक्रिय घटक (b) रैखिक घटक
(c) निष्क्रिय घटक (d) एकदिशीय घटक

[SSC-JE-MAINS (06.11.2024)]

445. निम्नलिखित परिपथ में समतुल्य धारिता ' C_{eq} ' ज्ञात कीजिए।



- (a) $25\mu F$ (b) $35\mu F$ (c) $30\mu F$ (d) $20\mu F$

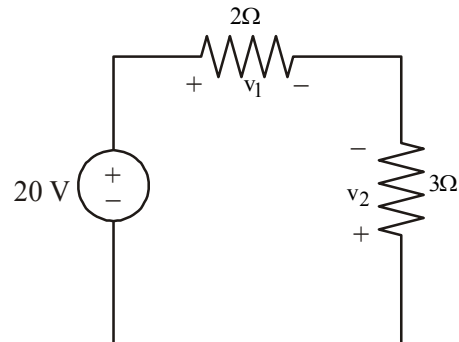
[SSC-JE-MAINS (06.11.2024)]

446. निम्नलिखित में से कौन सा एक निष्क्रिय इलेक्ट्रॉनिक घटक है?

- (a) ऑपरेशनल एम्पलीफायर (b) फोटो डायोड
(c) ट्रांजिस्टर (d) संधारित्र

[SSC-JE-MAINS (06.11.2024)]

447. निम्नलिखित परिपथ में वोल्टेज ' V_1 ' ज्ञात कीजिए



- (a) 8V (b) 12V (c) -12V (d) -8V

[SSC-JE-MAINS (06.11.2024)]

448. What component, integral to electrostatics, is designed to accumulate and discharge electrical energy by utilizing the electric field between two conductive plates?

- (a) Inductors (b) Resistors
(c) Transformers (d) Capacitors

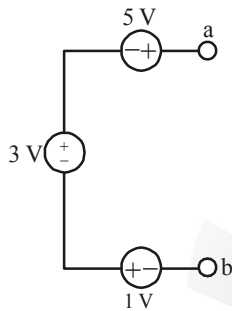
[SSC-JE-MAINS (06.11.2024)]

449. Determine the total charge transferred over the time interval of $0 \leq t \leq 10$ s, when the current is given as $i(t) = 0.5t$ A.

- (a) 5C (b) 25C (c) 10C (d) 50C

[SSC-JE-MAINS (06.11.2024)]

450. Find the voltage ' V_{ab} ' between terminals 'a' and 'b' in the following figure.



- (a) 1.7V (b) 9V (c) 3.1V (d) 4.3V

[SSC-JE-MAINS (06.11.2024)]

451. In a network with multiple resistors, if the delta-star transformation is applied, what is the equivalent delta resistance for a star-connected set of resistors $R_1 = 6\Omega$, $R_2 = 10\Omega$, and $R_3 = 15\Omega$

- (a) $R_{12} = 40\Omega$, $R_{13} = 20\Omega$, $R_{23} = 50\Omega$
(b) $R_{12} = 20\Omega$, $R_{13} = 30\Omega$, $R_{23} = 50\Omega$
(c) $R_{12} = 50\Omega$, $R_{13} = 30\Omega$, $R_{23} = 40\Omega$
(d) $R_{12} = 30\Omega$, $R_{13} = 20\Omega$, $R_{23} = 40\Omega$

[SSC-JE-MAINS (06.11.2024)]

448. दो प्रवाहकीय प्लेटों के बीच विद्युत क्षेत्र का उपयोग करके विद्युत ऊर्जा को संचय और निर्वहन करने के लिए डिज़ाइन किया गया कौन सा घटक इलेक्ट्रोस्टैटिक्स का समाकलित है?

- (a) प्रेरकत्व (b) रेसिस्टर्स (c) ट्रांसफॉर्मर (d) संधारित्र

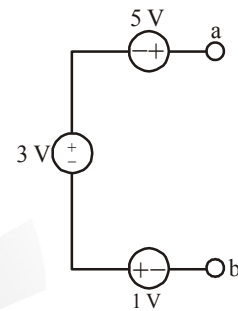
[SSC-JE-MAINS (06.11.2024)]

449. $0 \leq t \leq 10$ s के समय अंतराल में स्थानांतरित कुल आवेश निर्धारित करें, जब धारा $i(t) = 0.5t$ A के रूप में दी गई हो।

- (a) 5C (b) 25C (c) 10C (d) 50C

[SSC-JE-MAINS (06.11.2024)]

450. निम्नलिखित चित्र में टर्मिनल 'a' और 'b' के बीच वोल्टेज ' V_{ab} ' ज्ञात करें।



- (a) 1.7V (b) 9V (c) 3.1V (d) 4.3V

[SSC-JE-MAINS (06.11.2024)]

451. एकाधिक प्रतिरोधों वाले नेटवर्क में, यदि डेल्टा-स्टार स्थानांतरण लागू किया जाता है, तो स्टार-संयोजित प्रतिरोधकों $R_1 = 6\Omega$, $R_2 = 10\Omega$, और $R_3 = 15\Omega$ के सेट के लिए समतुल्य डेल्टा प्रतिरोध क्या है

- (a) $R_{12} = 40\Omega$, $R_{13} = 20\Omega$, $R_{23} = 50\Omega$
(b) $R_{12} = 20\Omega$, $R_{13} = 30\Omega$, $R_{23} = 50\Omega$
(c) $R_{12} = 50\Omega$, $R_{13} = 30\Omega$, $R_{23} = 40\Omega$
(d) $R_{12} = 30\Omega$, $R_{13} = 20\Omega$, $R_{23} = 40\Omega$

[SSC-JE-MAINS (06.11.2024)]

ANSWERS AND EXPLANATIONS

1. **Ans. (b)**

Capacitance does not allow sudden – Change in voltage.

$$I = C \frac{dV}{dt}$$

for sudden change it requires infinite current through capacitor, its practically impossible.

2. **Ans. (a)**

Ohm's law,

$$\frac{V}{I} = K = R$$

$$V = IR = \text{Linear}$$

(Area, Length, temperature should be constant i.e., no changes in these conditions).

3. **Ans. (b)**

Specific resistance or resistivity is property of material by which it is made up of.

4. **Ans. (a)**

For 100 W, 220 V

$$R_1 = \frac{V^2}{P} = \frac{220^2}{100} = 484 \, \Omega \quad \dots(1)$$

For 100 W, 110 V

$$R_2 = \frac{V^2}{P} = \frac{110^2}{100} = 121 \, \Omega \quad \dots(2)$$

From equation (1) and (2),

$$\frac{R_1}{R_2} = 4$$

5. **Ans. (b)**

$$C_{eq} = C_1 + C_2 + C_3 + C_4 \\ = 40 \, \mu\text{F}$$

6. **Ans. (a)**

$$R = \frac{l}{\sigma A}; \quad S = \frac{l}{\mu A}$$

permeance μ is analogous to conductivity σ 7. **Ans. (b)**

$$R_1 = \rho \frac{l_1}{A_1} \quad \dots(1)$$

$$R_2 = \rho \frac{l_2}{A_2} \quad \dots(2)$$

$$l_2 = l_1 + \frac{l_1}{10} = \frac{11l_1}{10}$$

$$\frac{l_2}{l_1} = \frac{11}{10} \quad \dots(3)$$

 $\therefore$ On stretching, volume will be constant.

$$l_1 A_1 = l_2 A_2$$

$$\frac{A_2}{A_1} = \frac{l_1}{l_2} \quad \dots(4)$$

From equation (1) and (2)

$$\frac{R_1}{R_2} = \frac{l_1}{l_2} \times \frac{A_2}{A_1}$$

$$= \frac{10}{11} \times \frac{10}{11}$$

From equation (3) and (4)

$$R_2 = R_1 \frac{121}{100}$$

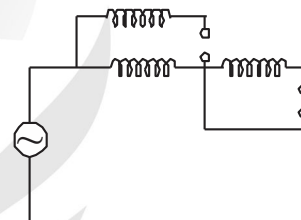
$$R_2 = 1.21 R_1$$

$$R_2 = 1.21 \times 10$$

$$= 12.1 \, \Omega$$

8. **Ans. (a)**

Maximum brightness at 100 W will occur when both 40 W bulb will be isolated from the circuit.

9. **Ans. (d)**

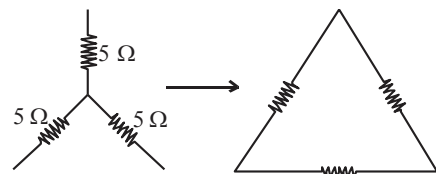
As the given circuit is balanced because

$$\frac{5}{10} = \frac{15}{30}$$

So,

$$R_{eq} = (5 + 15) \parallel (10 + 30)$$

$$= \frac{40}{3} \, \Omega$$

10. **Ans. (a)**

$$\frac{5 \times 5 + 5 \times 5 + 5 \times 5}{5} = 15 \, \Omega$$

11. **Ans. (a)**

Copper is the best conducting element given option

$$\rho_{Cu} < \rho_{Al} < \rho_{Fe} < \rho_{magnin}$$

12. *Ans. (a)*

$$V_{(20\mu F)} = \frac{C_1}{C_1 + C_2} \cdot 150$$

$$= \frac{10}{10 + 20} \times 150$$

$$= 50V$$

13. *Ans. (c)*

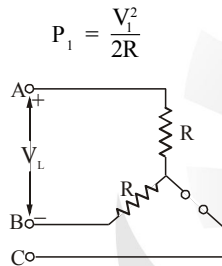
Best conductor of electricity is salt water because having more ions.

14. *Ans. (c)*15. *Ans. (c)*

As time constant of circuit is 0 so capacitor voltage will increase instantaneously so current will be very high it starting and become 0 just after. Instantaneously

16. *Ans. (b)*

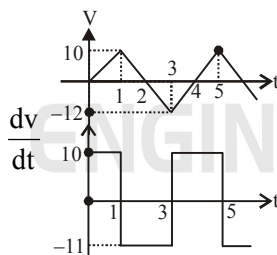
Power in one resistor removed star removed from star connected load.



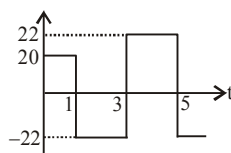
Power will be in all resistors

$$P_2 = 3 \left(\frac{V_L}{\sqrt{3}} \right)^2 \times \frac{1}{R} = \frac{V_L^2}{R}$$

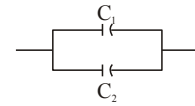
So, one of the resistors is disconnected, then the percentage reduction in load will be 50%

17. *Ans. (d)*

$$i = C \frac{dv}{dt}$$

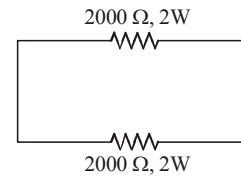
18. *Ans. (c)*

Unit electric-charge = Ampere-Second.

19. *Ans. (b)*

$$P.F. = \frac{p.f_{c_1} + p.f_{c_2}}{2}$$

$$= \frac{0.01 + 0.02}{2} = 0.015$$

20. *Ans. (b)*

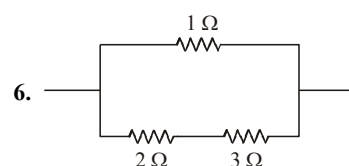
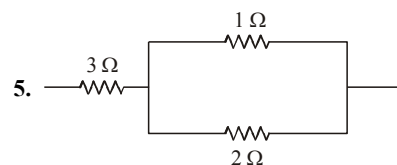
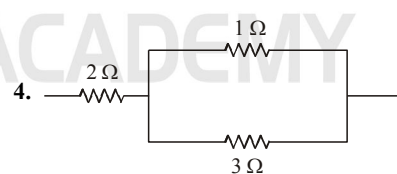
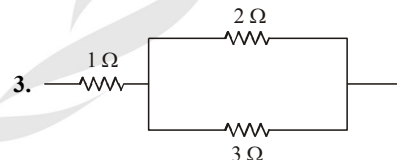
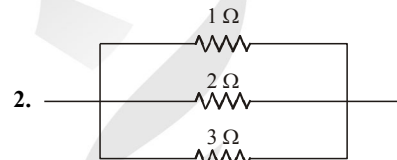
$$R_{eq} = R_1 \parallel R_2$$

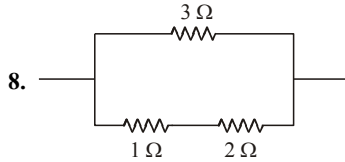
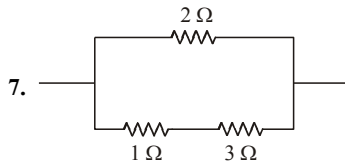
$$= \frac{2000 \times 2000}{2000 + 2000}$$

$$R_{eq} = 1000\Omega$$

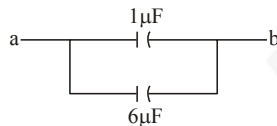
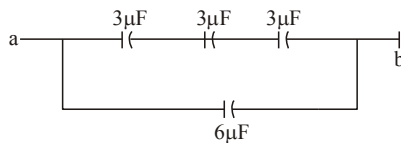
$$P = P_1 + P_2$$

$$= 2 + 2 = 4W$$

21. *Ans. (d)*

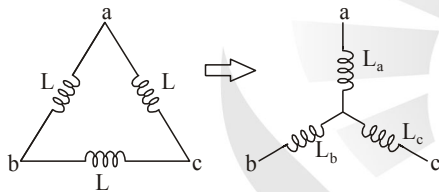


22. **Ans. (a)**



$$C_{ab} = (1 + 6) \mu\text{F} = 7 \mu\text{F}$$

23. **Ans. (c)**



$$L_Y = \frac{L_A}{3} = \frac{60}{3} \times 10^{-3} = 20\text{mH}$$

24. **Ans. (c)**

$$V_{OC} = 150 \text{ V}$$

$$R_{eq} = 75 \Omega$$

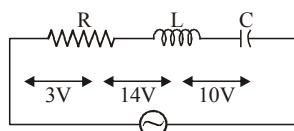
$$I_{SC} = \frac{V_{OC}}{R_{eq}} = 2 \text{ A}$$

$$R_{eq} = 75 \Omega$$

25. **Ans. (a)**

For blocking the DC component of a voltage signal a capacitor is connected in series with the voltage source.

26. **Ans. (b)**



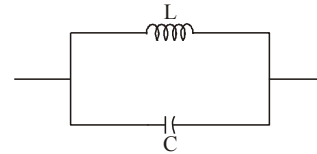
$$V_s = \sqrt{V_R^2 + (V_L - V_C)^2}$$

$$= \sqrt{3^2 + (14 - 10)^2}$$

$$V_s = 5 \text{ V}$$

27. **Ans. (d)**

Tank circuit is a parallel combination of L & C.



28. **Ans. (*)**

$$\frac{R_A}{R_B} = \frac{I_A}{I_B}$$

$$\Rightarrow \frac{800}{100} = \frac{I_A}{I_B}$$

$$\Rightarrow I_A = 8I_B$$

So, option is not matched.

29. **Ans. (a)**

Transistor is a semiconductor device having non linear circuit parameter.

30. **Ans. (b)**

A terminal where three or more branches meet is known as Node.

31. **Ans. (d)**

$$C_{eq} = [(2 || 1) + 2] || 1 + 2 \\ = 2.05 \mu\text{F}$$

Here '+' shows series connections.

32. **Ans. (a)**

$$R_A = 3R \text{ (for equal phase resistance)}$$

33. **Ans. (d)**

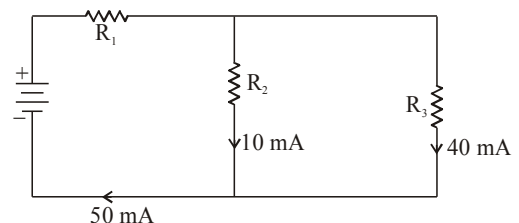
$$P \uparrow, R \downarrow, L \downarrow$$

For more watt bulb, less resistance will be there. So, length of that bulb will be shorter.

34. **Ans. (d)**

Current through $R_3 = 40 \text{ mA}$

$\therefore$ Voltage across $R_2 =$ Voltage across R_3



$$\Rightarrow 100 \times 10^3 \times 10 \times 10^{-3} = R_3 \times 40 \times 10^{-3}$$

$$\Rightarrow R_3 = 25 \text{ k}\Omega$$

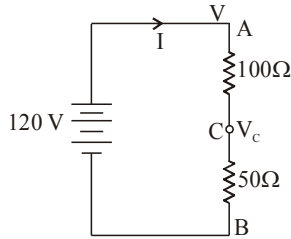
35. **Ans. (d)**

An ideal voltage source have zero internal resistance connected in series.

36. *Ans. (c)*

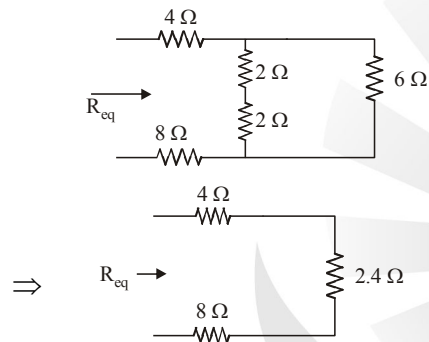
$$I = \frac{120}{100 + 50}$$

$$= \frac{12}{15} = 0.8 \text{ A}$$

Let voltage at C is V_c

$$\text{Then, } 120 - 100I - V_c = 0$$

$$V_c = 40 \text{ V}$$

37. *Ans. (a)*

$$\Rightarrow R_{eq} \rightarrow \left[6\Omega \parallel 4\Omega = \frac{6 \times 4}{10} = 2.4\Omega \right]$$

$$\Rightarrow R_{eq} = 4\Omega + 2.4\Omega + 8\Omega$$

$$= 14.4\Omega$$

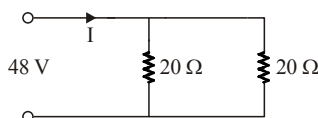
38. *Ans. (d)*

$$R = \frac{l}{\sigma A}$$

$$\sigma = \frac{l}{RA} = \frac{\text{m}}{\Omega \cdot \text{m}^2} = \Omega^{-1} \text{m}^{-1}$$

39. *Ans. (c)*Voltage drop across 14.5Ω resistance

$$= 14.5 \times 2 = 29 \text{ V}$$

40. *Ans. (b)*

$$I = \frac{48}{10\Omega} = 4.8 \text{ A}$$

Current will divide equally in both sides.

Hence current in 8Ω resistor = 2.4 A 41. *Ans. (b)*

$$C = \frac{KA\epsilon_0}{d}$$

On inserting oil soaked paper between the plates K will increased.

$$Q = CV$$

$$\Rightarrow V \propto \frac{1}{C}$$

As,

$$K \uparrow, C \uparrow, V \downarrow$$

42. *Ans. (a)*

$$R = \frac{\rho \times A}{V}$$

$$\rho = \frac{RV}{A} = \Omega \cdot \text{m}^3/\text{m}^2$$

43. *Ans. (a)*

$$R_{eq} = 2\Omega \parallel 4\Omega \parallel 5\Omega \parallel 20\Omega$$

$$= 2\Omega \parallel 4\Omega \parallel 4\Omega$$

$$\left[20\Omega \parallel 5\Omega = \frac{20 \times 5}{25} = 4\Omega \right]$$

$$= 2\Omega \parallel 2\Omega = 1\Omega$$

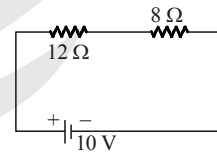
44. *Ans. (c)*

From the figure given, we have

$$I = 8 = \frac{100}{R + (10\Omega \parallel 10\Omega)}$$

$$= \frac{100}{R + 5}$$

$$R = 7.5\Omega$$

45. *Ans. (b)*

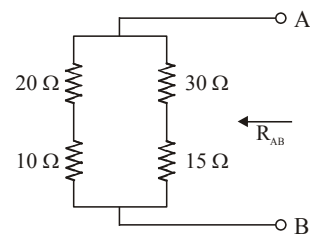
$$I = \frac{10}{12 + 8} = 0.5 \text{ A}$$

power consumed in the circuit, P

$$= 0.5^2(12 + 8) = 5 \text{ watts}$$

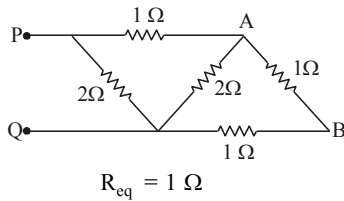
46. *Ans. (a)*Current flowing through 50Ω resistor is zero because the bridge is in balanced condition.

Then,



$$R_{AB} = 30\Omega \parallel 45\Omega$$

$$= \frac{30 \times 45}{75} = 18\Omega$$

47. **Ans. (a)**48. **Ans. (d)**

Junction of two or more elements are called as Node.

49. **Ans. (c)**

$$P = \frac{V^2}{R} = \frac{100 \times 100}{20} = 500\text{W}$$

50. **Ans. (a)**

If connected in series voltage will be shared between them, so connected in parallel will realise full rated power.

51. **Ans. (d)**

Those element which supplies energy is called active element.

52. **Ans. (b)**

resistive is low for copper and high alloy because copper is a good conductor

53. **Ans. (c)**

Because Resistance code is Red, Orange, Orange silver.

Hence, according to colour coding

Red & orange → digits

Orange → multiplier

Silver → tolerance

$$R = 23 \times 10^3 \pm 10\%$$

$$I = \frac{V}{R} = \frac{50}{23 \times 10^3}$$

$$= 2.17\text{ mA} \approx 2.2\text{ mA}$$

54. **Ans. (d)**

$$V = IR$$

$$= 750 \times 10^{-6} \times 11 \times 10^3$$

$$V = 8.25\text{ V}$$

55. **Ans. (c)**

If capacitor are connected in parallel, then

$$C_{eq} = C_1 + C_2$$

56. **Ans. (d)**

Two similar polarity charge particles always repel each other.

57. **Ans. (a)**

The force between two charges is electrostatic and electron is negatively charged and nucleus is positively charged hence they attract each other.

58. **Ans. (c)**

When an atom leaves or accepts an electron it becomes an ion hence ions are charged always while atoms are neutral.

59. **Ans. (c)**

Current always flows from one terminal of source.

60. **Ans. (a)**

In a metallic conductor only electrons are free to move, so they participate in conduction.

61. **Ans. (d)**

When a constant potential difference V is applied between the ends of the conductor an electric field $\vec{E}$ is produced inside the conductor. The conduction electrons within the conductor are then subjected to a force $-e\vec{E}$ and move overall in the direction of increasing potential. However, this force does not cause the electrons to move faster and faster. Instead, a conduction electron accelerates through a very small distance and then collides with one of the atoms of the conductor. Because of the electric and collision force a conduction electron moves slowly along the conductor, it acquires a drift velocity V_d in the direction opposite to $\vec{E}$. The magnitude of the drift velocity is on the order of 10^{-4} m/s.

62. **Ans. (b)**

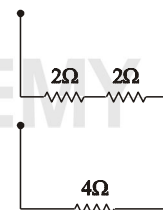
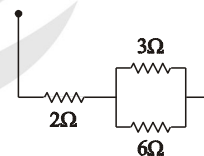
Force on current carrying conductor when it is kept in magnetic field is given by

$$\vec{F} = I(\vec{\ell} \times \vec{B})$$

Here $\vec{B}$ is in $(-\hat{i})$ direction & $\vec{\ell}$ is in $\hat{k}$ direction so

$$\vec{F} = I\ell B(-\hat{k} \times \hat{i})$$

$$\vec{F} = I\ell B(-\hat{j}) \text{ [Downward]}$$

Alternative Method: Direction can be determined by Fleming's right hand rule.63. **Ans. (c)**55. **Ans. (c)**

If capacitors are connected in parallel, then

$$C_{eq} = C_1 + C_2$$

56. **Ans. (d)**

Two similar polarity charge particles always repel each other.

57. **Ans. (a)**

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58. **Ans. (c)**

When an atom leaves or accepts an electron it becomes an ion hence ions are charged always while atoms are neutral.

64. **Ans. (a)**

Number of mesh equation

$$= b - n + 1$$

 b = number of branches n = number of nodes65. **Ans. (c)**

If work is done by the battery in taking a charge q from negative terminal to positive terminal then work done by the battery per unit charge is called emf of battery unit = joule / Coulomb or volt.

66. **Ans. (d)**

Capacitor is the element which is used to store the charge in the form of electrostatic field.

$$P = \frac{1}{2} CV^2$$

67. **Ans. (d)**

Unit of inductor is henry, in the name of American Scientist Joseph henry.

68. **Ans. (b)**

Capacitor have two plates separated by a di-electric

69. **Ans. (d)**

Electrolytic capacitor have large value of capacitance. This is of three types.

- (i) Aluminium electrolytic capacitor
- (ii) Tantalum electrolytic capacitor
- (iii) Niobium electrolytic capacitor

70. **Ans. (c)**

Dielectric constant

$$K = \frac{\text{Electric field in dielectric}}{\text{Electric field in air}}$$

$$= \frac{100 \times E_{(\text{in air})}}{E_{(\text{in air})}} = 100$$

71. **Ans. (a)**

There are five type of capacitor and ceramic capacitor among them have smallest size.

- (i) Ceramic capacitor
- (ii) Film capacitor
- (iii) Power film capacitor
- (iv) Electrolytic capacitor
- (v) Paper capacitor

72. **Ans. (d)**

When the capacitor is charged, the charge on its plates remains for longer period of time. But every insulator has some conductivity. In the dielectric medium some current flows through the capacitor if it is connected to a battery so the reason behind internal heating of capacitor is leakage resistance.

73. **Ans. (a)**

Equivalent capacitance when connected in series is given by

$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

$$= \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

$$\frac{1}{C_{eq}} = \frac{1}{10}$$

$$\Rightarrow C_{eq} = 10 \mu F$$

74. **Ans. (a)**

As we know

$$C = \frac{K\epsilon_0 A}{d}$$

High permittivity means high value of K.

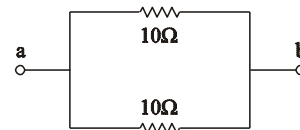
If K is increased C also increases. So while making capacitor we should choose dielectric material with high permittivity.

Also it reduces the net electric field across capacitors.

75. **Ans. (c)**

Flow of electron in a circuit is called current.

76. **Ans. (c)**



$$R_{ab} = \frac{10 \times 10}{10 + 10} = \frac{100}{20} = 5 \Omega$$

77. **Ans. (c)**

No. of node pair voltage

$$= \frac{n \times (n-1)}{2}$$

$$= \frac{10 \times 9}{2} = 45$$

78. **Ans. (a)**

According to tellegen theorem “the summation of instantaneous power for the n number of branches is an electrical network is zero.”

Tellegen theorem is applicable mainly in general class of lumped networks that consists of linear, non-linear, active, passive, time variant, time invariant elements.

79. **Ans. (b)**

Directed movement of electron is known as current but the reason of the flow of electron is voltage or electric potential so voltage causes current to flow.

80. **Ans. (a)**

Mica capacitor also known as silver mica capacitor which offer high precision, reliability, stability and used where low losses is required.

81. **Ans. (a)**

In a capacitor charge is stored in dielectric medium between them.

82. **Ans. (b)**

When a dielectric is placed in electric field the field strength is decreases because of induced charge in dielectric and the direction of induced charge opposes the main field direction. Hence net field strength reduce by factor K.

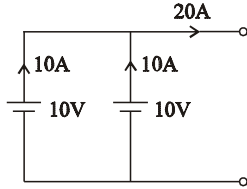
Where K = dielectric constant.

83. **Ans. (c)**

As shown in figure v_1 and v_2 is parallel to each other.

119. *Ans. (d)*

Both batteries are connected in parallel with same voltage rating and current rating. Since in parallel connection voltage remains same across load but current flowing through load will be sum of current supplied by the battery.

120. *Ans. (a)*

For Ohm's law physical condition of a conductor like temperature, pressure must be kept constant.

121. *Ans. (c)*

Resistivity of copper

$$\rho_{\text{cu}} = 1.68 \times 10^{-8} \Omega\text{-m}$$

Resistivity of aluminium

$$\rho_{\text{Al}} = 2.65 \times 10^{-8} \Omega\text{-m}$$

Resistance of copper wire of 5m and 2 mm²

$$R = \frac{\rho_{\text{cu}} \ell}{A}$$

$$= \frac{1.68 \times 10^{-8} \times 5}{2 \times 10^{-6}}$$

$$R = 0.042 \Omega$$

Resistance of copper wire of 1m and 6 mm²

$$R = \frac{\rho_{\text{cu}} \ell}{A}$$

$$= \frac{1.68 \times 10^{-8} \times 1}{6 \times 10^{-6}}$$

$$R = 0.0028 \Omega$$

Resistance of aluminum wire of 8m and 1mm²

$$R = \frac{\rho_{\text{Al}} \ell}{A}$$

$$= \frac{2.65 \times 10^{-8} \times 8}{1 \times 10^{-6}}$$

$$R = 0.212 \Omega$$

Resistance of aluminium wire of 1m and 6mm²

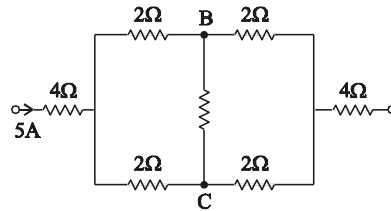
$$R = \frac{\rho_{\text{Al}} \ell}{A}$$

$$= \frac{2.65 \times 10^{-8} \times 1}{6 \times 10^{-6}}$$

$$R = 0.0044 \Omega$$

122. *Ans. (d)*

Here wheatstone bridge is in balanced condition so no current will flow through middle arm BC.

123. *Ans. (d)*

Voltage drop $V = IR$

$$\therefore R = \frac{\rho \ell}{A}$$

$$\therefore V = \frac{I \rho \ell}{A}$$

Depends on specific resistance, length, voltage and cross-sectional area.

124. *Ans. (d)*

In parallel circuit potential difference across the resistance is same but current may or may not be same.

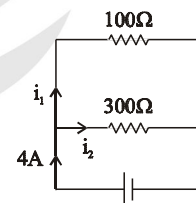
125. *Ans. (d)*

$$i_1 = \frac{300}{300+100} \times 4$$

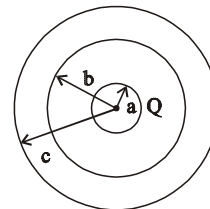
$$i_1 = 3\text{A}$$

$$i_2 = 4 - 3 = 1\text{A}$$

$$\frac{i_1}{i_2} = \frac{3}{1}$$

126. *Ans. (b)*

Let say sphere A, sphere B and sphere C of radius a, b and c respectively.



Since there is no charge inside sphere A so given charge Q will appear on outer surface of A.

Due to induction equal and opposite charge (-Q) will appear on inner surface and +Q on outer surface of sphere B.

418. *Ans. (c)*419. *Ans. (a)*420. *Ans. (a)*421. *Ans. (a)*422. *Ans. (c)*423. *Ans. (a)*424. *Ans. (a)*

We know

$$R_2 = R_1[1 + \alpha(T_2 - T_1)]$$

Here

$$T_1 = 20^\circ\text{C},$$

$$R_1 = 20 \Omega$$

$$T_2 = 60^\circ, \quad R_2 = 40 \Omega$$

$$40 = 20 [1 + \alpha(60 - 20)]$$

$$2 = 1 + \alpha(40)$$

$$\alpha = \frac{1}{40} \text{ per}^\circ\text{C}$$

425. *Ans. (c)*426. *Ans. (a)*

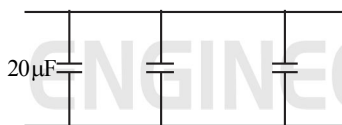
When connected in series



$$C_{eq} = \frac{1}{\frac{1}{20} + \frac{1}{20} + \dots}$$

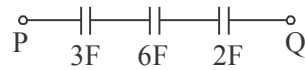
$$= \frac{20}{10} = 2 \mu\text{F}$$

When connected in parallel

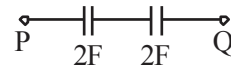


$$C'_{eq} = 20 \times 10 = 200 \mu\text{F}$$

$$\frac{C_{eq}}{C'_{eq}} = \frac{2}{200} = \frac{1}{100}$$

427. *Ans. (c)*428. *Ans. (a)*429. *Ans. (c)*430. *Ans. (c)*431. *Ans. (b)*432. *Ans. (d)*

$$\frac{3 \times 6}{9} = 2\text{F}$$



$$C_{eq} = \frac{2 \times 2}{2 + 2} = \frac{4}{4} = 1\text{F}$$

433. *Ans. (a)*

$$I_{6\Omega} = \frac{4}{10} \times 40 = 16$$

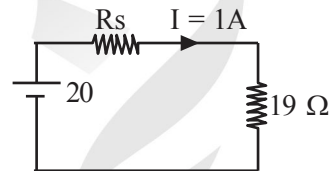
$$P_{6\Omega} = I^2 \times R = 16^2 \times 6$$

$$= 256 \times 6$$

$$= 1536 \text{ W}$$

434. *Ans. (b)*435. *Ans. (a)*

CDCS, CDVS, VDVS, VDCS.

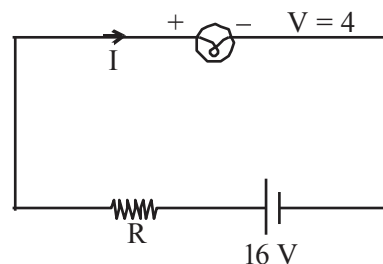
436. *Ans. (a)*

$$I = \frac{20}{R_s + 19}$$

$$1 = \frac{20}{R_s + 19}$$

$$R_s + 19 = 20$$

$$R_s = 1 \Omega.$$

437. *Ans. (c)*

$$I = 40 \text{ mA}$$

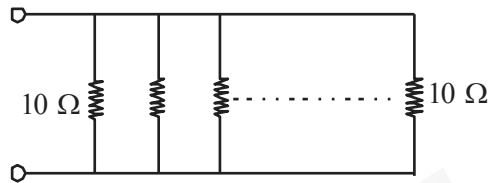
$$R = \frac{16 - 4}{I}$$

$$= \frac{12}{40\text{mA}} = \frac{12000}{40} = 300 \Omega.$$

438. *Ans. (a)*

Resistor is frequency independent.

439. *Ans. (b)*



$$\frac{1}{R_{eq}} = \frac{1}{10} + \frac{1}{10} + \dots + \frac{1}{10}$$

$$\frac{1}{R_{eq}} = \frac{10}{10} = 1 \Omega.$$

$$R_{eq} = 1 \Omega$$

440. *Ans. (a)*

$$C = \frac{\epsilon A}{d}$$

$$C' = \frac{\epsilon A / 4}{10d} = \frac{\epsilon A}{d} \times \frac{1}{40}$$

$$C' = \frac{C}{40}$$

441. *Ans. (b)*

$$P_{\max} = 784 \text{ W}$$

$$R = 4 \Omega$$

$$P_{\max} = I^2 R$$

$$784 = I^2 4$$

$$I = \sqrt{196} = 14 \text{ A}$$

442. *Ans. (b)*

443. *Ans. (d)*

$$P = V \cdot I \text{ J/S}$$

$$E = P \times t \cdot J$$

$$= VI \times t$$

$$E = I^2 R t \text{ J}$$

444. *Ans. (a)*

Active component is used to deliver power or process electrical signals.

445. *Ans. (d)*

446. *Ans. (d)*

447. *Ans. (a)*

448. *Ans. (*)*

449. *Ans. (b)*

450. *Ans. (b)*

451. *Ans. (b)*