

1. Which of the following depends on charging and discharging rate of a capacitor?

- a) Time constant
- b) Current
- c) Power
- d) Voltage

Explanation: The time constant in a circuit consisting of a capacitor is the product of the resistance and the capacitance ($\tau=RC$). Smaller the time constant, faster is the charging and discharging rate and vice versa.

Answer: a

2. What is the initial current while charging a capacitor?

- a) High
- b) Low
- c) 0
- d) Cannot be determined

Explanation: The initial current of a capacitor is very high because the voltage source will transport charges from one plate of the capacitor to the other plate.

Answer: a

3. What is the final current while charging a capacitor?

- a) High
- b) Zero
- c) Infinity
- d) Low

Explanation: The final current is almost equal to zero while charging a capacitor because the capacitor is charged up to the source voltage

Answer: b

4. A capacitor is charged to a voltage of 400V and has a resistance of 20ohm. Calculate the initial value of charging current.

- a) 10A
- b) 0A
- c) Infinity
- d) 20A

Explanation: When the capacitor is charging the initial value if the current is $V/R=400/20 = 20A$.

Answer: d

5. When will be capacitors fully charged?

- a) When voltage is zero
- b) When the supply voltage is equal to the capacitor voltage
- c) When voltage is infinity
- d) When capacitor voltage is equal to half the supply voltage

Explanation: When the capacitor voltage is equal to the source voltage, voltage across capacitor becomes equal voltage across generator

Answer: b

6. What happens to the capacitor when the capacitor voltage is equal to the source voltage?

- a) The charging phase of the capacitor is over
- b) The discharging phase of the capacitor is over
- c) The capacitor is switched off
- d) The capacitor is switched on

Explanation: When the capacitor voltage is equal to the source voltage, then no current, thus capacitor acts as an open switch

Answer: c

7. The charging time constant of a circuit consisting of a capacitor is the time taken for the charge in the capacitor to become _____ % of the initial charge.

- a) 33
- b) 63
- c) 37
- d) 36

During charging after $t = \tau \Rightarrow q = 0.63Q_{\max}$

Answer: b

8. The discharging time constant of a circuit consisting of a capacitor is the time taken for the charge in the capacitor to become _____ % of the initial charge.

- a) 33
- b) 63
- c) 37
- d) 36

During discharging after $t = \tau \Rightarrow q = 0.37Q_{\max}$

Answer: c

8. A circuit has a resistance of 2 ohm connected in series with a capacitance of 6F. Calculate the charging time constant.

a) 3

$$\tau = RC \Rightarrow \tau = 2 \times 6 = 12s$$

b) 1

Answer: c

c) 12

d) 8

9. A circuit has a resistance of 5 ohm connected in series with a capacitance of 10F. Calculate the discharging time constant.

a) 15

$$\tau = RC \Rightarrow \tau = 5 \times 10 = 50s$$

b) 50

c) 5

Answer: b

d) 10

9. What is the value of current in a discharging capacitive circuit if the initial current is 2A at time $t=RC$.

a) 0.74A

$$\text{During discharging after } t = \tau \Rightarrow i = 0.63I = 0.63 \times 2 = 1.26A$$

b) 1.26A

Answer: b

c) 3.67A

d) 2.89A

10. What is the value of current in a charging capacitive circuit if the initial current is 2A at time $t=RC$.

a) 0.74A

b) 1.26A

c) 3.67A

d) 2.89A

During charging after $t = \tau \Rightarrow i = 0.37I = 0.37 \times 2 = 0.74A$

Answer: a