

April 2024

Time - Three hours
(Maximum Marks: 100)

- [N.B. 1. Answer all questions under Part-A each question carries 3 marks.
2. Answer all the questions either (A) or (B) in Part-B each question carries 14 marks.]

PART - A

1. State Ohm's law.
2. A $100\mu\text{F}$ capacitance is charged to a steady voltage of 500V. What is the energy stored in the capacitor?
3. Write the expression for star to delta transformations.
4. Draw the current equivalent of voltage source.
5. Define average value and RMS value of A.C. quantity.
6. Define the terms: (i) Form factor (ii) Peak factor.
7. What is meant by phase sequence?
8. Show that the line voltage in a balanced star connected system is $\sqrt{3}$ times of phase voltage.
9. List the active materials used in Nickel Cadmium cell.
10. Define AH efficiency.

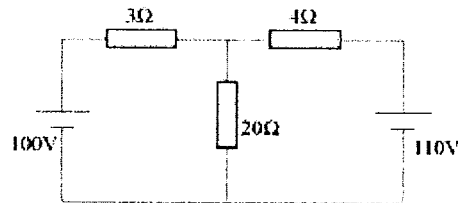
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PART - B

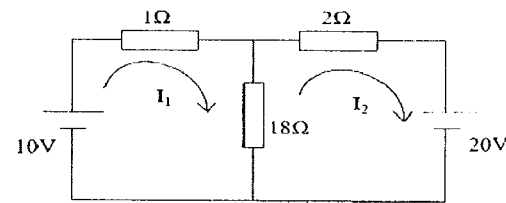
11. (a) (i) Derive an expression for the equivalent capacitance of 3 capacitors in series. (4)
 (ii) Three resistors of 1Ω , 2Ω and 4Ω are connected in parallel. A 5Ω resistor is connected in series with this parallel combination and a $24V$ battery is connected to the circuit. Find the total current and power in each resistor. (10)

(Or)

- (b) (i) Derive an expression for the equivalent resistance of 3 resistors in series. (4)
 (ii) Determine the currents in different branches of the circuit shown in the below figure by applying Kirchhoff's law. (10)



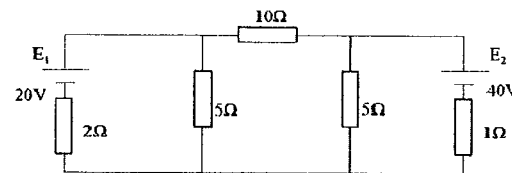
12. (a) (i) Find the current through 18Ω resistor in the given circuit using mesh analysis. (10)



- (ii) State Thevenin's theorem. (4)

(Or)

- (b) Find the current through 10Ω resistor using superposition theorem.



13. (a) (i) Derive an expression for average value of AC quantity in terms of maximum value. (6)
 (ii) Find the impedance, current and phase angle of the series circuit having a resistance of 10Ω and inductance of 10 millihenry. The applied voltage is $200V$, $50Hz$. (8)

(Or)

- (b) The equation for a voltage is written as $E = 100 \sin 314 t$. Find (i) frequency (ii) maximum value (iii) average value (iv) RMS value and (v) voltage at time $1/200$ s after passing first zero.

14. (a) (i) A balanced delta connected load of $(8+j6)$ Ohms per phase is connected to a 3 phase $230V$ supply. Find the line current, power factor, power and total volt ampere. (10)
 (ii) Draw the diagram of 3 phase power measurement by two wattmeter method. (4)

(Or)

- (b) (i) The readings of the two watt meters used to measure power in a capacitive load are $3000W$ and $8000W$ respectively. Calculate (a) the input power, (b) the power factor at the load. (10)
 (ii) Define positive sequence and negative sequence. (4)

15. (a) Explain the construction and working of lead acid battery.

(Or)

- (b) (i) Explain the care and maintenance of batteries (7).
 (ii) Explain about mercury cells (7).
