

ES103

[ET]

Enroll. No. - _____

SUPPLEMENTARY EXAMINATIONS 2024

Basic Electrical Engineering

Time :3.00 Hrs

Maximum Marks :60

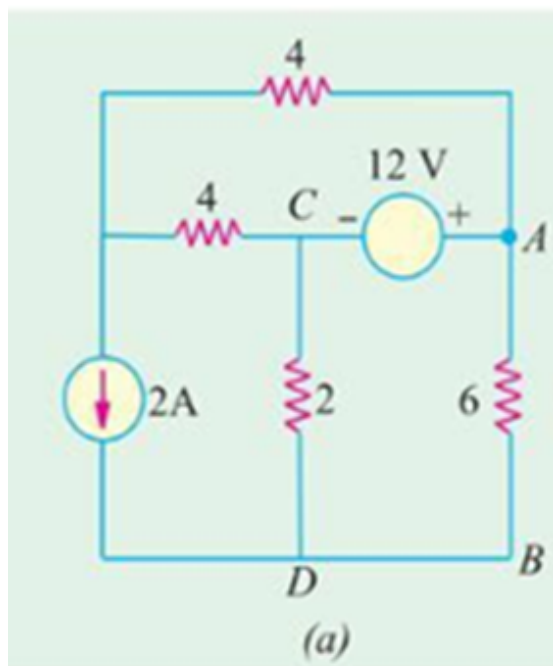
Note: Attempt questions from all sections as directed.

non Programmable Scientific calculator is permitted

Section - A : Attempt any Four questions out of Five . Each question carries 06 marks. [24 Marks]

Q1.

State Thevenin's theorem. find the current flowing through the 6Ω resistor of the network shown in Fig. (a) using Thevenin's theorem. All resistances are in ohms.



Q2.

State and discuss Kirchhoff's laws. For the network shown in figure Fig. Q3, find the voltage across AB.

(6)

(6)

Q3.

State Norton's theorem and find the current using Norton's theorem through a load of $5\ \Omega$ in the circuit shown in Fig. Q3.

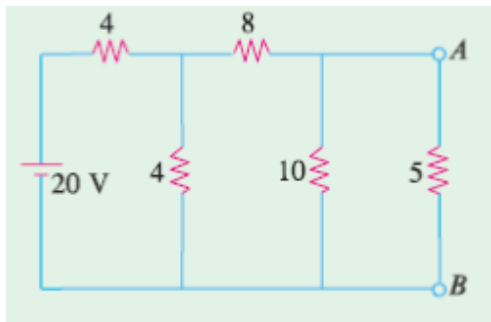
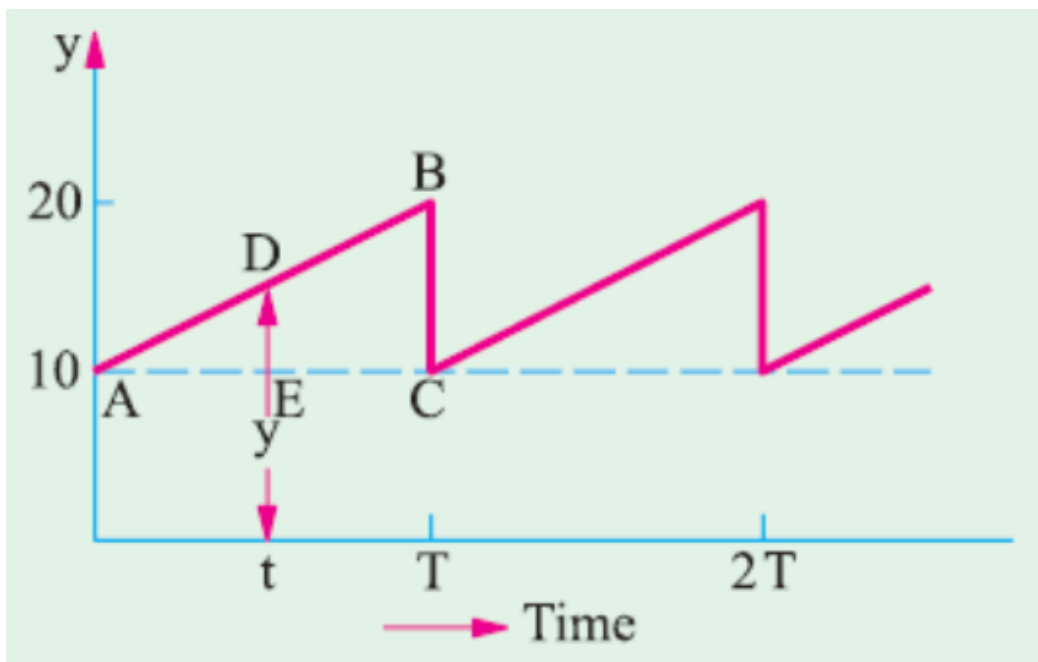


Fig. Q3

Q4.

Determine the r.m.s. and average value of the waveform shown in the figure below.



Q5.

The potential difference measured across a coil is 4.5 V when it carries a direct current of 9 A . The same coil when carries an alternating current of 9 A at 25 Hz , the potential difference is 24 V . Find the current, the power, and the power factor when it is supplied by 50 V , 50 Hz supply.

Section – B : Attempt any two questions out of three. Each question carries 10marks.

(6)
[20 Marks]

Q6.

(10)

Discuss the use of shunts and multipliers. Derive the expression for both, with reference to meters used in electrical circuits.

A moving coil instrument has a resistance of $10\ \Omega$ and gives full-scale deflection when carrying a current of 50 mA. Show how it can be adapted to measure voltage up to 750 V and currents up to 1000A.

Q7.

Discuss the different power measurement methods in 3 phase circuits. Draw necessary diagrams.

(10)

Q8. (a)

An R-L-C series circuit consists of a resistance of $1000\ \Omega$, an inductance of 100 mH and a capacitance of 10 p F. If a voltage of 100 V is applied across the combination, find (i) the resonance frequency (ii) Q-factor of the circuit

(5)

(b)

Explain the principle of operation of DC motor.

Section - C : Compulsory question

(5)

[16 Marks]**Q9. (a)**

A 25 kVA transformer has 5000 turns on the primary and 50 turns on the secondary winding. The primary is connected to a 3000-V, 50-Hz supply. Find the full-load primary and secondary currents, the secondary emf, and the maximum flux in the core. Neglect leakage drops and no-load primary current.

(6)

(b)

A 220 V DC machine has an armature resistance of 0.5 ohm. if the full load armature current is 20 A. Find the induced emf when the machine acts as (i) Generator (ii) Motor

(6)

(c)

Three $100\ \Omega$ non-inductive resistances are connected in star across 400-V, 50-Hz, and 3-phase mains. Calculate the power taken from the supply.

If one of the three resistances getting open-circuited or removed, what would be the value of total power taken from the mains?

(4)

