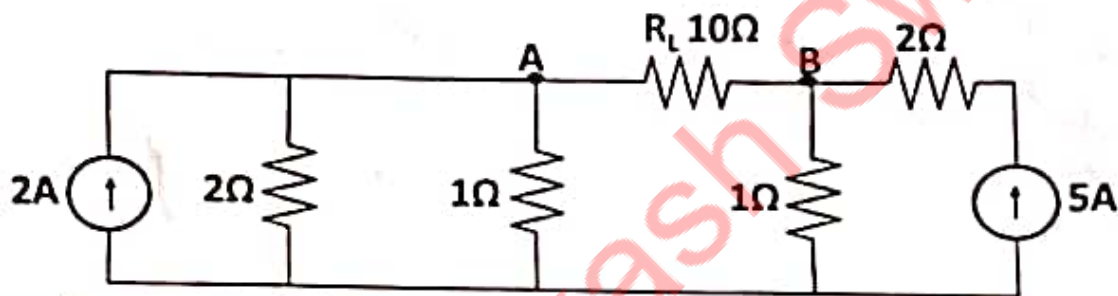


**Final Assessment Test (FAT) – January/February 2023**

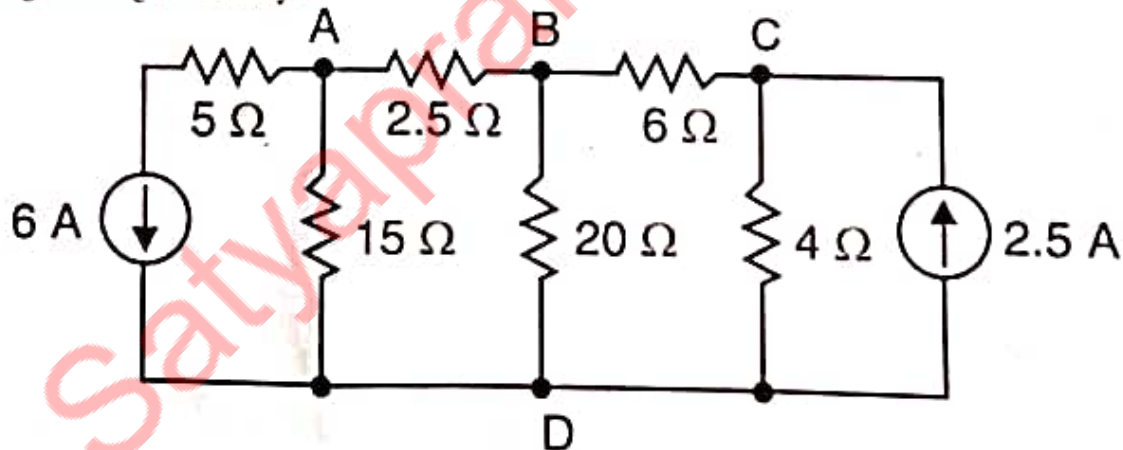
Programme	B.Tech.	Semester	Fall Semester 2022-23
Course Title	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	Course Code	BEEE102L
Faculty Name	Prof. Anantha Krishnan V	Slot	BI+III
		Class Nbr	CH2022231700084
Time	3 Hours	Max. Marks	100

Part A (10 X 10 Marks)**Answer All questions**

- ✓ For the circuit shown in figure, obtain the Thevenin's equivalent circuit and find the load current. [10]



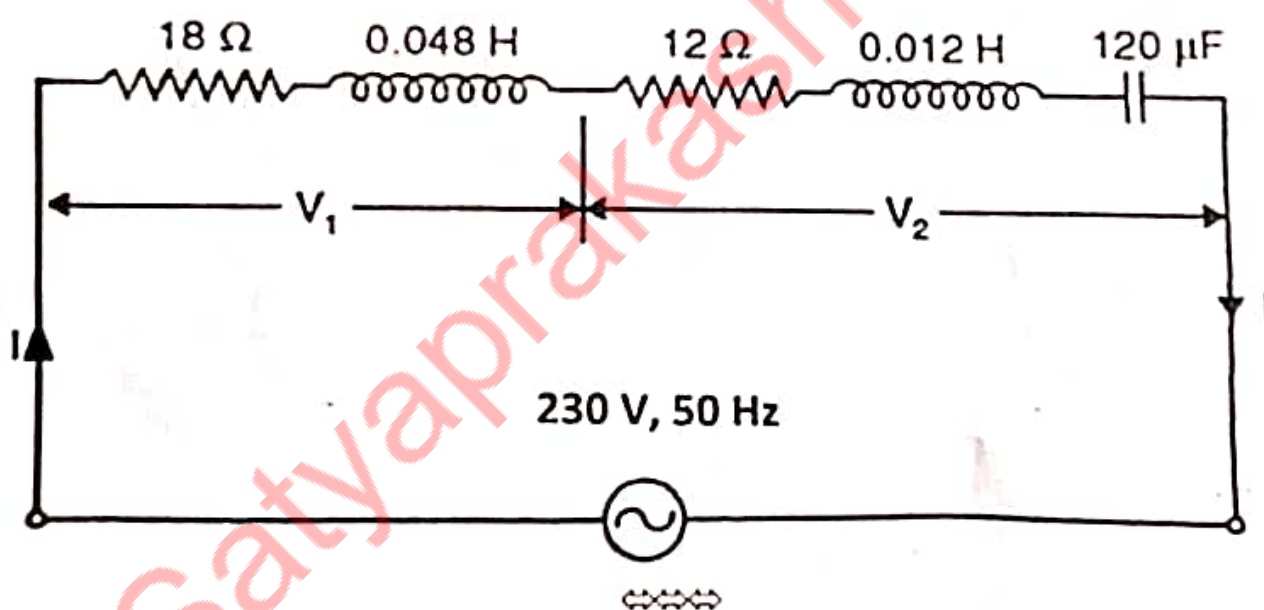
- ✓ Solve for nodal voltages V_a , V_b and V_c at the nodes A, B and C respectively in the circuit shown in figure using nodal analysis. [10]



- ✓ A 400 V, 3-phase supply is connected across a balanced load of three impedances each consisting of a $32\text{-}\Omega$ resistance and $24\text{ }\Omega$ inductive reactance in series. Determine the current drawn from the supply, if the three impedances are [10]
(a) Y-connected (b) Δ -connected
- ✓ A steel ring of cross sectional area 50 mm^2 has an air gap of 2 mm and has the same cross sectional area as the steel ring. A coil of 2000 turns is wound uniformly around the steel ring. If the current in the coil is 10 A, the mean radius of the steel ring is 5 cm and relative permeability μ_r is 800, find [10]
a) total reluctance of the circuit
b) the flux in the ring

5. With suitable diagrams, elucidate the construction and working principle of an electrical machine that converts electrical energy to mechanical energy. [10]
6. i. Explain in detail about the formation, different biasing conditions and characteristics of PN junction diode. [10]
 ii. Write the applications of Zener diode.
7. Plot the logical expression on a four-variable Karnaugh map. Obtain the simplified expression. [10]

$$F(A, B, C, D) = ABCD + \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}BC + AB\overline{C}$$
8. What is a multiplexer? Construct an 8 X 1 multiplexer with necessary truth table and logic diagram. [10]
9. With neat diagram, explain the construction and operation of a single phase transformer. Deduce the expression for induced emf in the transformer. [10]
10. In the diagram shown below, the circuit is connected to a 230V, 50 Hz supply. Determine the following. [10]
- Current drawn
 - Voltage V_1 and V_2
 - Power factor
 - Draw the phasor diagram with voltage, current and phase angle



Programme	B.Tech.	Semester	Fall Semester 2022-23
Course Title	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	Course Code	BEEE102L
Faculty Name	Prof. Umayal C	Slot	B2+TB2
Time	3 Hours	Class Nbr	CH2022231700092
		Max. Marks	100

Part A (10 X 10 Marks)

Answer All questions

1. Use mesh analysis to find V_{ab} and i_o in the circuit shown in Figure.1.

[10]

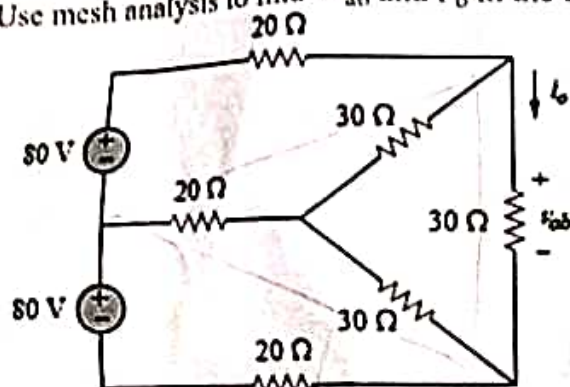


Figure.1

2. Determine the Thevenin's equivalent at terminals a-b of the circuit shown in Figure.2:

[10]

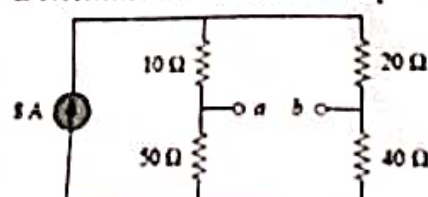


Figure.2

3. When a voltage of 100 V at 50 Hz is applied to a choking coil A (RL circuit-Figure.3), the current taken is 8 A and the power is 120 W. When applied to coil B, the current is 10 A and the power is 500 W. What current and power will be taken when 100 V is applied to the two coils connected in series?

[10]

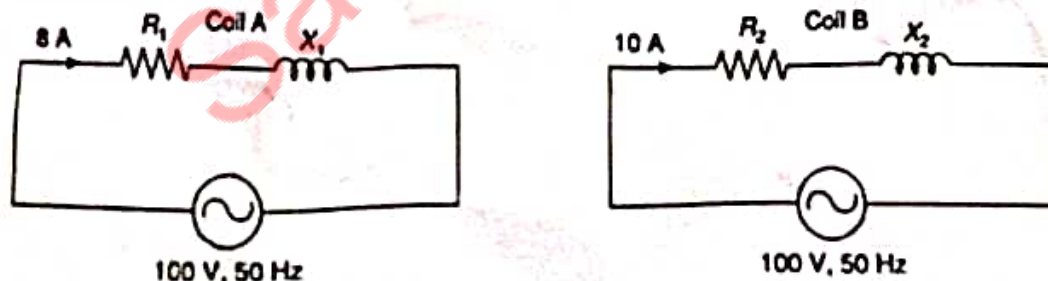


Figure.3

4. The secondary of a 3-phase star-connected transformer, which has a phase voltage of 230 V, feeds a 3 phase delta connected load; each phase of which has a resistance of 30 Ω and an inductive reactance of 40 Ω. Draw the circuit diagram of the system and calculate:

[10]

- The voltage across each phase of load
- The current in each phase of load

- c) The current in the transformer secondary windings
d) The total power taken from the supply and its power factor.
5. (a) A magnetic circuit of cross-sectional area 0.4 cm^2 consists of one part 3 cm long, of material having relative permeability 1200, and a second part 2 cm long of material having relative permeability 750. With a 100-turn coil carrying 2 A, find the value of flux existing in the circuit. (4 marks) [10]
- (b) A coil, x, has 1500 turns and a coil, y, situated close to x has 900 turns. When a current of 1 A flows in coil x a flux of 0.2 mWb links with x and 0.65 of this flux links coil y. Determine (a) the self-inductance of coil x and (b) the mutual inductance between the coils. (6 marks)
6. Discuss in detail with neat diagrams, about the motor used in high speed vacuum cleaners. The electric current in the short-circuited rotor which is essential to produce torque is obtained via electromagnetic induction from the rotating magnetic field of the stator winding. Also elaborate on other applications of this motor. [10]
7. (a) The armature of a 6-pole DC generator has a wave winding containing 650 conductors. Calculate the generated emf when the flux per pole is 0.055 wb and the speed is 300 rpm. Calculate the speed at which the armature must be driven to generate an emf of 500V if the flux per pole is reduced to 0.05 wb. (4 marks) [10]
- (b) With a neat diagram, discuss the construction and working principle of single phase transformer. (6 marks)
8. i. Find the octal representation of $(1345)_{10}$. (2 Marks) [10]
ii. Reduce the given Boolean expression to minimum number of literals. (2 Marks) ϕ
 $(yz' + x'w)(xy' + zw')$
iii. Write the complement of the given function. (3 Marks)
 $F = x(yz' + yz)$
iv. Express the Boolean function $F = x'y + xz$ as product of maxterms (3 Marks)
9. A lawn sprinkling system is controlled automatically by certain combination of following variables: [10]
Season (S=1 during summer, 0 during winter)
Temperature (T=1 if high; 0 if low)
Atmospheric humidity (H=1 if high; 0 if low)
Moisture content of the soil (M=1 if high; 0 if low)
The sprinkler is turned ON under the following circumstances:
(i) The moisture content is low in winter
(ii) Temperature is high and moisture content low in summer.
(iii) Temperature is high and humidity is high in summer
(iv) Temperature is low and moisture content is low in summer.
(v) Temperature is high and humidity is low.
Design the Sprinkling system using suitable 2 input gates.
10. Elucidate a typical application circuit that uses four semiconductor switches to convert AC into DC, along with the necessary schematics and waveforms. [10]





Final Assessment Test (FAT) – January/February 2023

Programme	B.Tech.	Semester	Fall Semester 2022-23
Course Title	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	Course Code	BEEE102L
Faculty Name	Prof. PRASATH T	Slot	E2+1E2
		Class Nbr	CH2022231700966
Time	3 Hours	Max. Marks	100

Section 1 (7 X 10 Marks)

Answer All questions

1. Find v_o , all the branch currents and the power supplied by the current source in the circuit shown in Fig.1 [10]

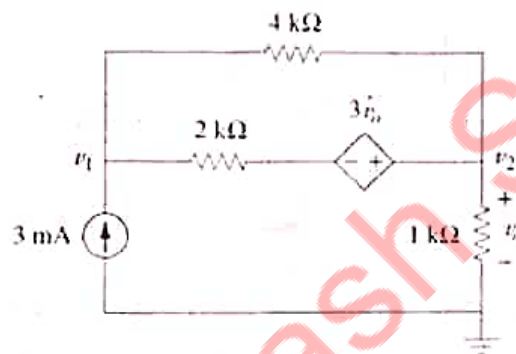


Fig.1

2. If a load resistance R is connected across the terminals $a - b$ in the circuit shown in Fig.2, find the maximum power that will be delivered to the load. [10]

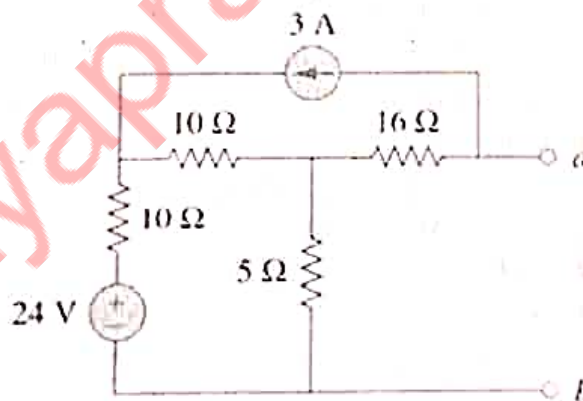


Fig.2

3. A resistor $R = 50\Omega$, an inductor $L = 0.4H$ and a capacitor $C = 0.25F$ are connected in series to a voltage source $v(t) = 110 \sin(100t + 60^\circ)$ V. Compute, [10]
- Total Impedance Z
 - RMS value of the current $i(t)$.
 - Voltage across the capacitor $v_o(t)$
 - Average power absorbed by each element in the circuit.
 - Apparent power supplied by the source and the power factor.

Final Assessment Test (FAT) - JUNE/JULY 2023

Programme	B.Tech.	Semester	Winter Semester 2022-23
Course Title	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	Course Code	BEEE102L
Faculty Name	Prof. SUBASHINI M	Slot	B1+TB1
		Class Nbr	CH2022232300609
Time	3 Hours	Max. Marks	100

Section-A (6 X 10 Marks)

Answer All questions

01. Find the maximum power that can be delivered to the resistor R in the circuit shown in Figure 1. [10]

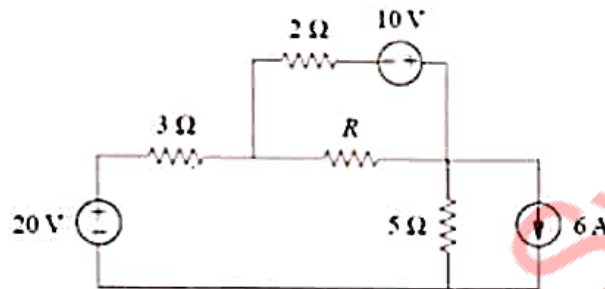


Figure 1

02. Find the node voltages V_a , V_b and V_c for the circuit shown in Figure 2. [10]

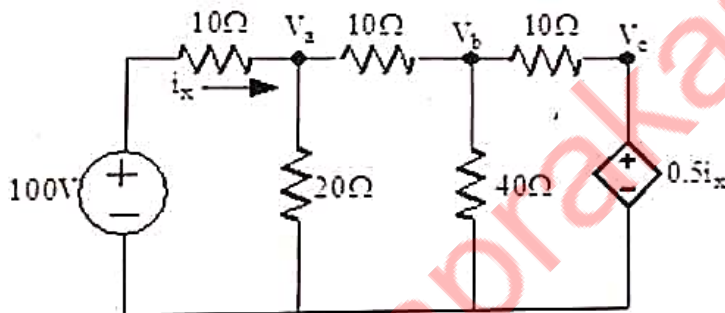


Figure 2

03. An electromagnet in the form of ID is shown in figure 3 and the iron square section 4cm wide. A flux of 1.1mwb is required in the air gap. Neglecting leakage and fringing, calculate the number of ampere turns required. Take the relative permeability of 2000 at this flux density. [10]

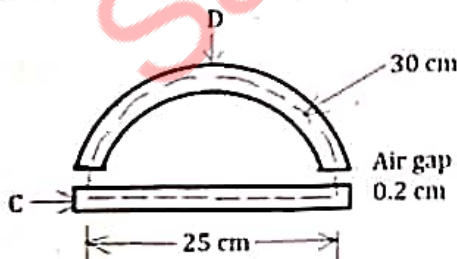


Figure 3

04. A 250V shunt motor runs at 1000 rpm at no-load and takes 8A. The total armature and shunt field resistances are 0.2Ω and 250Ω respectively. Calculate the speed when loaded and taking 50A, assume that the flux to be constant. [10]

05. Explain the operating principle of the stepper motor. Also discuss the various modes in the stepper motor. [10]

06. Implement the Boolean function using 2 X 1 MUX. [10]

$$F = \sum m(1, 3, 4, 6, 7, 9, 10, 12, 13, 14)$$

Section-B (2 X 15 Marks)

Answer All questions

07. Three identical coils having a resistance of 10 ohms and inductance of 42mH are forms as (a) a star (b) a delta. These coils are connected to a voltage source of 415V with phase angle of 0° (rms), 50Hz, 3 phase supply. Determine the total power dissipated in each case. [15]

08. The mutual inductance between two coils is $M=0.2H$ for the circuit shown in Figure 4 and the source voltage is $v_s(t) = 12\cos 10t$ V . Find the current i_1 and i_2 . [15]

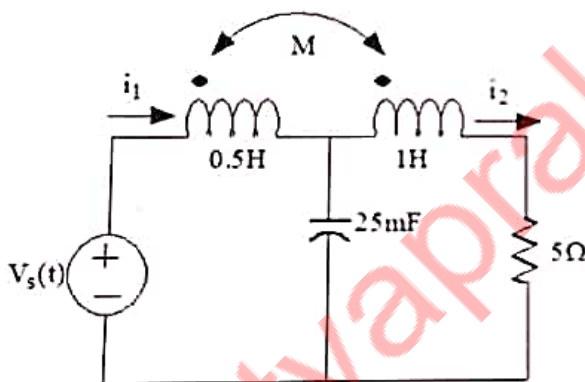


Figure 4

Section-C (2 X 5 Marks)

Answer All questions

09. Discuss the working of a full-wave rectifier without and with filter circuit. [5]

10. Explain the operation of the enhancement type MOSFET and its characteristic curves. [5]

