[No. of Printed Pages – 4]

SSE299

ES103
[ET]

Enrol. No. .....

SPECIAL SUPPLEMENTARY EXAMINATION :
AUGUST, 2022

BASIC ELECTRICAL ENGINEERING

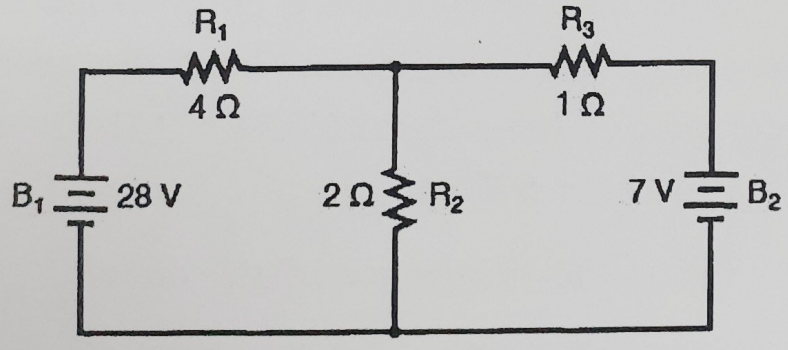
Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed. Use of scientific calculator is allowed.***

SECTION – A (24 Marks)

Attempt any **four** *questions out of* **five.**
Each question carries **06** *marks.*

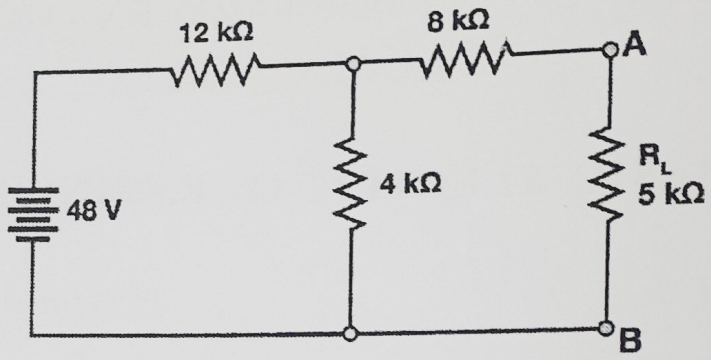
1. Explain Superposition theorem. Using Superposition theorem, find the current through the 2Ω resistor of the circuit shown in the figure.



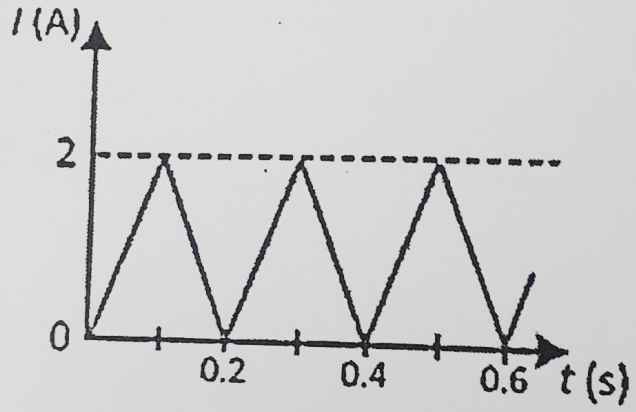
P.T.O.

2. Derive the equation for converting a Star connected network to equivalent Delta connected network.

3. Determine the current in the 5 kΩ resistor across AB of network shown in fig using Thevenin's theorem.



4. Find the average value for the waveform shown in the figure below.



5. In a series circuit containing pure resistance and a pure inductance, the current and the voltage are expressed as : $i(t) = 5 \sin (314\,t + 2\,\Pi/3)$ and $v(t) = 15 \sin (314\,t + 5\,\Pi/6)$

   (a) What is the impedance of the circuit?

   (b) What is the value of the resistance?

(c) What is the inductance in henrys?

(d) What is the power factor?

SECTION – B

(20 Marks)

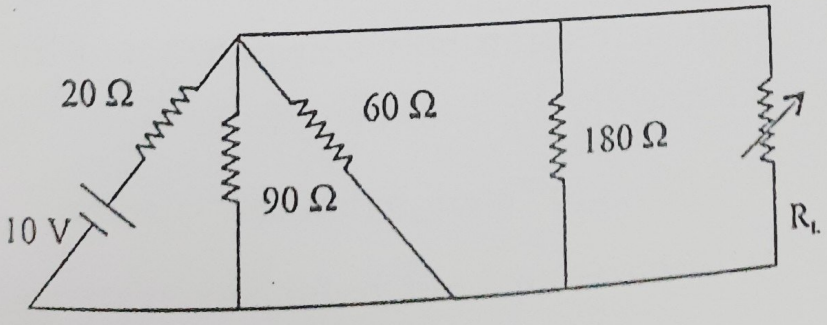
Attempt any **two** *questions out of* **three**. *Each question carries* **10** *marks.*

6. Explain the working of moving-coil instruments with the help of a neat diagram. Discuss the advantages and limitations of PMMC instruments. Enlist the applications of this type of instruments.

7. Explain the construction and working principle of a DC machine.

8. (a) Prove that the efficiency of a transformer is maximum when copper loss is equal to the iron loss. (6)

(b) For the circuit shown below, what will be the value of RL to get the maximum power? What is the maximum power delivered to the load? (4)

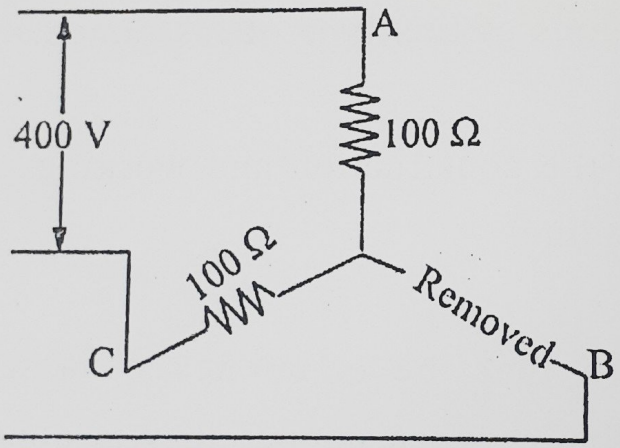


SECTION – C (16 Marks)

(Compulsory)

9. (a) Consider a case of three 100Ω non-inductive resistances connected in star, across a 400-V, 50-Hz, 3-phase mains. Calculate the power taken from the supply.

In the event of one of the three resistances getting open- circuited, what would be the value of total power taken from the mains? (6)



(b) In a three-phase power measurement by two wattmeter method, both the wattmeter read the same value. What is the power factor of the load? Justify your answer. (4)

(c) Establish relation between phase and line current and phase and line voltage of the following system :

(i) Star connected balanced system

(ii) Delta connected balanced system (6)

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Enrol. No. .....

SPECIAL SUPPLEMENTARY EXAMINATION :
AUGUST, 2022

BASIC ELECTRICAL ENGINEERING

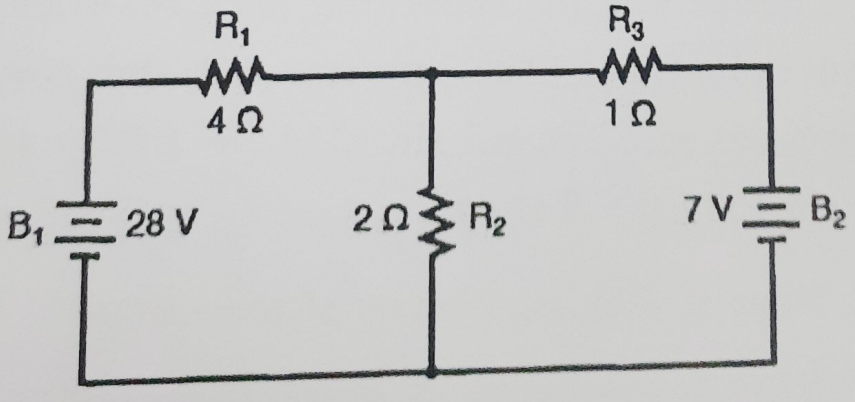
Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed. Use of scientific calculator is allowed.***

SECTION – A (24 Marks)

Attempt any **four** *questions out of* **five.**
Each question carries **06** *marks.*

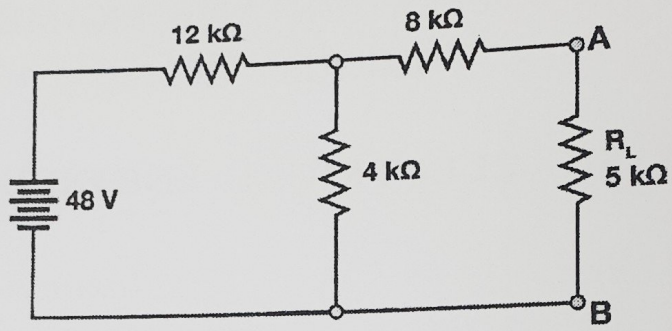
1. Explain Superposition theorem. Using Superposition theorem, find the current through the 2Ω resistor of the circuit shown in the figure.



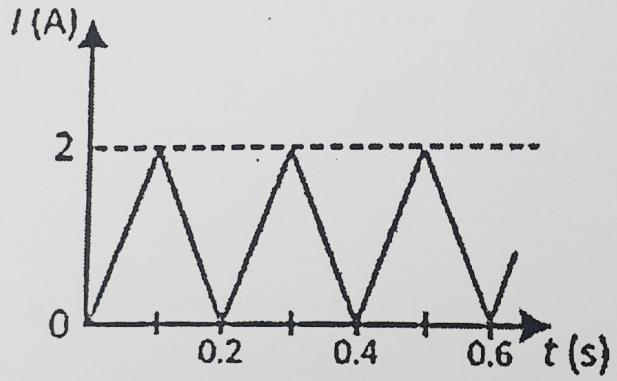
P.T.O.

2. Derive the equation for converting a Star connected network to equivalent Delta connected network.

3. Determine the current in the 5 kΩ resistor across AB of network shown in fig using Thevenin's theorem.



4. Find the average value for the waveform shown in the figure below.



5. In a series circuit containing pure resistance and a pure inductance, the current and the voltage are expressed as : $i(t) = 5 \sin (314\,t + 2\,\Pi/3)$ and $v(t) = 15 \sin (314\,t + 5\,\Pi/6)$

   (a) What is the impedance of the circuit?

   (b) What is the value of the resistance?

(c) What is the inductance in henrys?

(d) What is the power factor?

SECTION – B

(20 Marks)

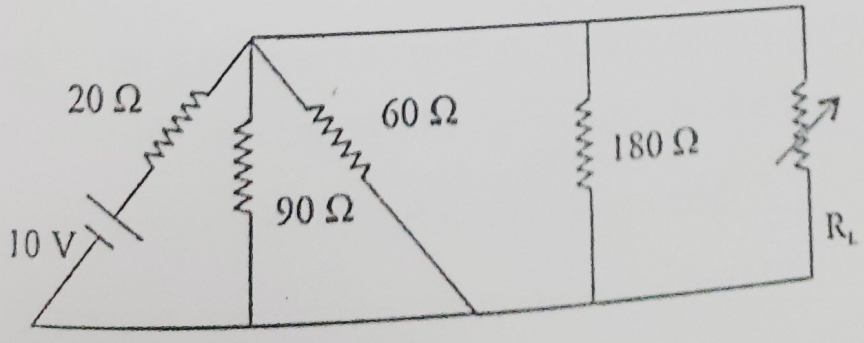
Attempt any **two** *questions out of* **three**.
Each question carries **10** *marks.*

6. Explain the working of moving-coil instruments with the help of a neat diagram. Discuss the advantages and limitations of PMMC instruments. Enlist the applications of this type of instruments.

7. Explain the construction and working principle of a DC machine.

8. (a) Prove that the efficiency of a transformer is maximum when copper loss is equal to the iron loss. (6)

(b) For the circuit shown below, what will be the value of RL to get the maximum power? What is the maximum power delivered to the load? (4)

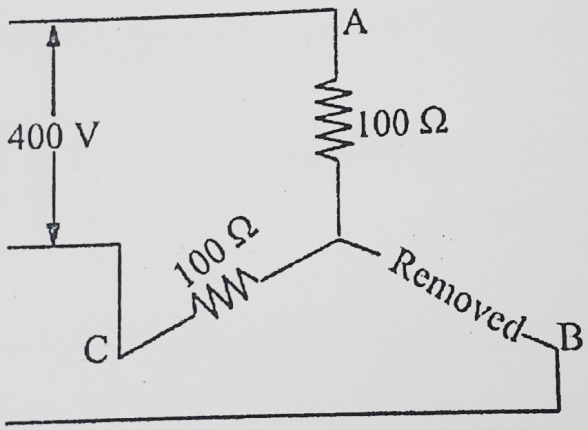


SECTION – C (16 Marks)

(Compulsory)

9. (a) Consider a case of three 100Ω non-inductive resistances connected in star, across a 400-V, 50-Hz, 3-phase mains. Calculate the power taken from the supply.

In the event of one of the three resistances getting open- circuited, what would be the value of total power taken from the mains? (6)



(b) In a three-phase power measurement by two wattmeter method, both the wattmeter read the same value. What is the power factor of the load? Justify your answer. (4)

(c) Establish relation between phase and line current and phase and line voltage of the following system :

(i) Star connected balanced system

(ii) Delta connected balanced system (6)

(100)

[No. of Printed Pages – 4]

ES103

[ET] Enrol. No. .....

END SEMESTER EXAMINATION : JUNE 2022

BASIC ELECTRICAL ENGINEERING

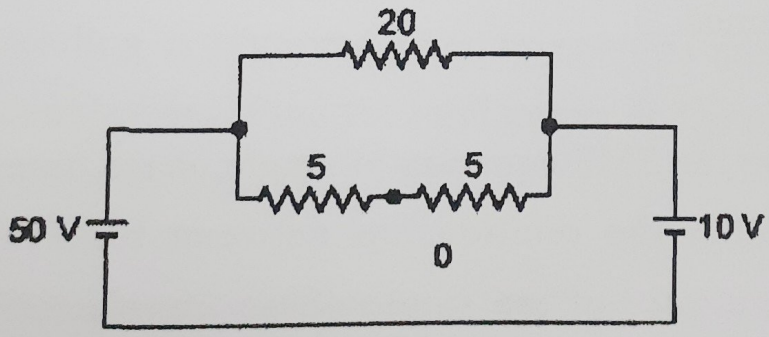
Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed. Use of Scientific calculator is allowed.***

SECTION – A **(24 Marks)**

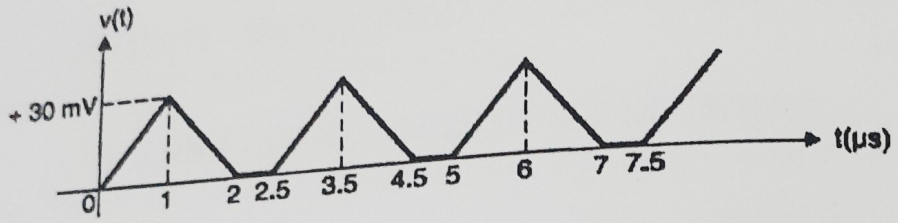
Attempt any **four** *questions out of* **five.**
Each question carries **06** *marks.*

1. State Superposition theorems in DC networks. Using superposition theorem find the current through the 20 Ω resistor in the circuit shown in fihure below.



P.T.O.

2. Find the average value of the waveform shown in the figure below.



3. A permanent-magnet moving coil instrument gives full-scale reading of 25 mA when p.d. across its terminals is 75 mV. Show how it can be used (i) as an ammeter for a range of 0-100 A (ii) as a voltmeter for a range of 0-750 V. Also find the multiplying power of the shunt and voltage amplification.

4. Three similar coils are star connected to a 3-phase, 400 V, 50 Hz supply. If the inductance and resistance of each coil are 38.2 mH and 16 ohms respectively, determine (i) line current (ii) power factor (iii) power consumed.

5. Derive the EMF equation of single phase transformer. Establish the relationship between turn ratio and voltage ratio of the single phase transformer.

SECTION – B

(20 Marks)

Attempt any **two** *questions out of* **three**. *Each question carries* **10** *marks.*

6. (a) A coil of resistance 20 ohms is in series with an inductance of 0·04 H. A supply of 230 V, 50 Hz is applied to the combination. Determine the capacitance which when connected in series with the coil causes no change in the magnitude and power taken from the supply. (5)

(b) Discuss series resonance and derive the expression for resonant frquency for series resonant circuit. (5)

7. (a) Explain two wattmeter method for 3 phase power measurement.Draw its connection diagram for star connected load. (5)

(b) Power in a three phase circuit is measured by two wattmeter method. The readings of the wattmeters are 5 kW and 0.5 kW, the latter reading is obtained after reversal of current coil connections. Find the total power and power factor of the circuit. (5)

8. (a) Discuss classification of DC generators on the basis of excitation. (5)

P.T.O.

(b) Find the useful flux per pole on no load of a 250 V, 6-pole shunt motor having wave connected armature winding with 110 turns. The armature resistance including brush is 0.2 ohms. The armature current is 13. 3 A at no load speed of 908 rpm. (5)

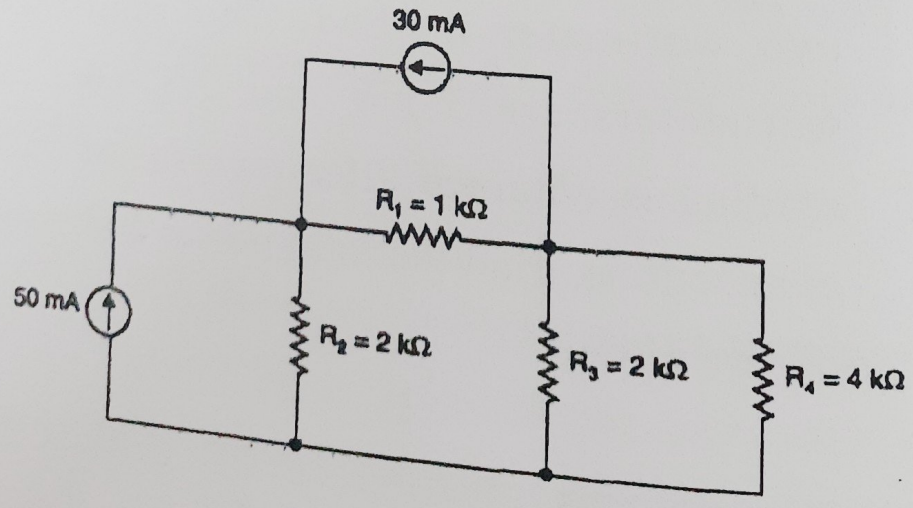
SECTION – C (16 Marks)

(Compulsory)

9. (a) Explain construction and working of PMMC instruments. Also discuss in brief how their range can be increased. (6)

(b) State and prove maximum power transfer theorem for dc networks. (6)

(c) Use nodal analysis to find current in the 4 kΩ resistor shown in Fig (5)



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ES103

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Enrol. No. .....

END SEMESTER EXAMINATION : JUNE 2022

BASIC ELECTRICAL ENGINEERING

Time : 3 Hrs.

Maximum Marks : 60

Note: ***Attempt questions from all sections as directed. Use of Scientific calculator is allowed.***

SECTION – A **(24 Marks)**

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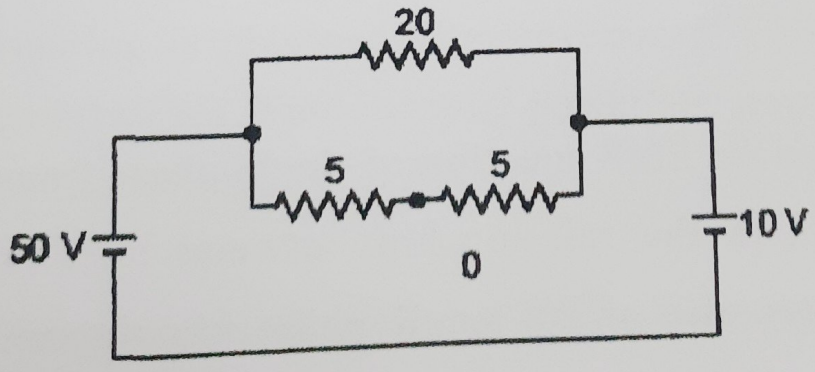

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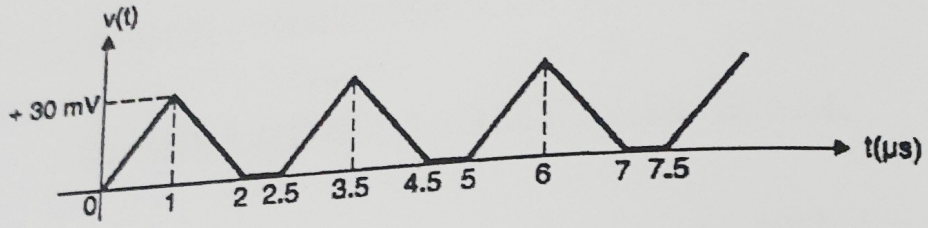

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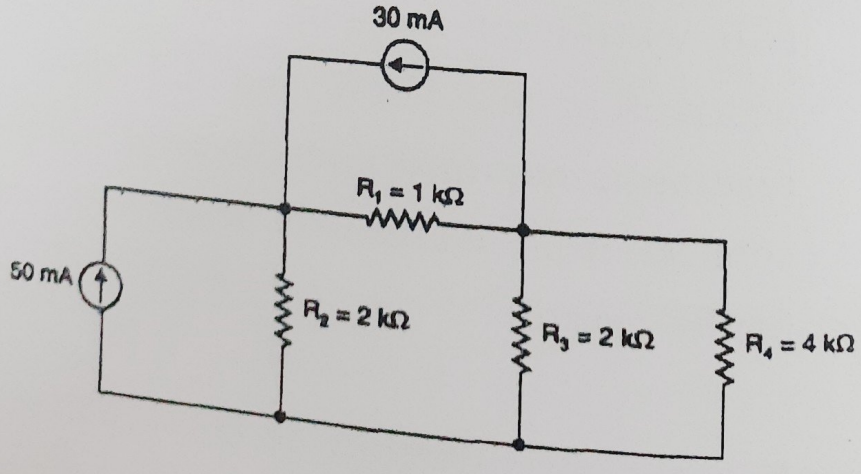


[ET]

Enrol. No. .....

END SEMESTER EXAMINATION : APRIL-MAY, 2019

BASIC ELECTRICAL ENGINEERING

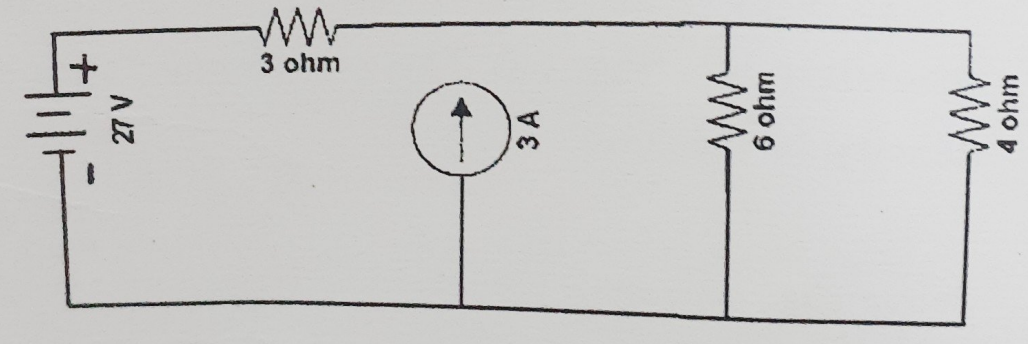
Time : 3 Hrs. *Maximum Marks : 70*

Note: ***Attempt questions from all sections as directed. Use of Non Programmable Scientific calculator is allowed.***

SECTION – A (30 Marks)

Attempt any **five** *questions out of* **six.**
Each question carries **06** *marks.*

1. Determine the current in 4Ω resistance using Thevenin's theorem in the following circuit :



2. The equation for an alternating current is i = 42.42 sin 628t. Determine (i) the maximum value; (ii) rms value; (iii) average value; (iv) form factor

P.T.O.

3. (a) What are dynamometer-type wattmeters? How deflecting, controlling and damping torque is provided in such instruments? (3)

(b) How the range of measurement of basic d.c. ammeter can be extended using shunt? (3)

4. For a R-L-C series circuit discuss the nature of the power factor for :

(i) $X_L > X_C$ (ii) $X_L < X_C$ (iii) $X_L = X_C$. Also draw the phasor diagram for each case.

5. A single phase, 50 Hz transformer has 80 turns on the primary winding and 400 turns on the secondary winding. The net cross- sectional area of the core is 200 cm^2. If the primary winding is connected to 240 V, 50 Hz supply, (i) Determine e.m.f. induced in secondary winding, (ii) The maximum value of flux density in the core.

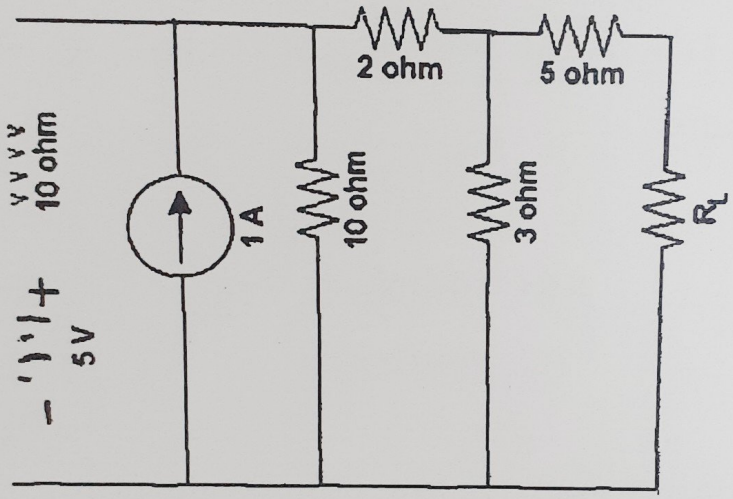
6. Prove that power in three-phase balanced circuit can be deduced from the readings of two watt-meters with the help of suitable vector diagrams. Discuss the nature of power factor when (i) W1=W2 (ii) Wl=–W2 (iii) W1=0 or W2=0.

8.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**
Each question carries **10** *marks.*

7. (a) In the circuit shown in figure, find the condition for maximum power transfer to R_L. Determine the maximum power transferred.



(6)

(b) Define the following :

(i) Active network and Passive network

(ii) Unilateral and Bilateral element (4)

8. (a) Draw the circuit diagram of separately excited d.c. generator and d.c. compound generator. State their voltage and current equations. (6)

(b) Derive the e.m.f. equation of a single phase transformer. (4)

P.T.O.

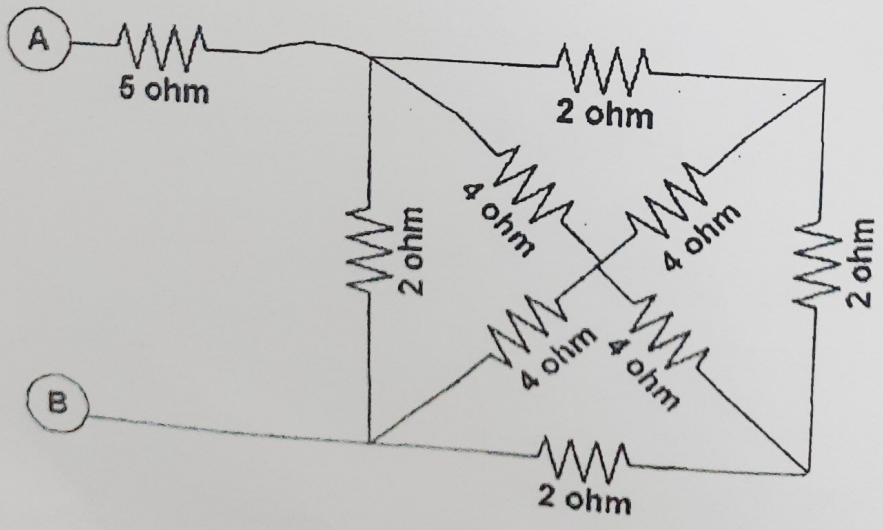
9. (a) Derive an expression for impedance, phase angle and power for series R-L-C circuit energized by sinusoidal voltage. (5)

(b) A balanced star connected load is connected from symmetrical 3-ϕ, 400 V supply system. The current in each phase is 30 A with lagging power factor at 30°. Find (i) Impedance in each phase (ii) Total power drawn (iii) Draw phasor diagrams. (5)

SECTION – C (20 Marks)

(Compulsory)

10. (a) Determine the resistance between points A and B in the network shown in Figure. (8)



(b) Three identical coils connected in delta across 400 V, 50 Hz, 3-ϕ a.c. supply, the line current is 17.32 A at a power factor of 0.8 lagging. Calculate (i) the phase current (ii) the resistance and inductance of each coil (iii) the power drawn by each coil. (6)

(c) A PMMC instrument has a coil of dimensions 10 mm * 8 mm. The flux density in the air gap is 0.15 Wb/m^2. If the coil is wound for 100 turns, carrying a current of 5 mA. Calculate (i) deflecting torque (ii) angular deflection with spring constant as $0.2 * 10^{-6}$ Nm/degree. (8)

ES103
[ET]

Enrol. No. .....

END SEMESTER EXAMINATION : NOV.–DEC., 2021

BASIC ELECTRICAL ENGINEERING

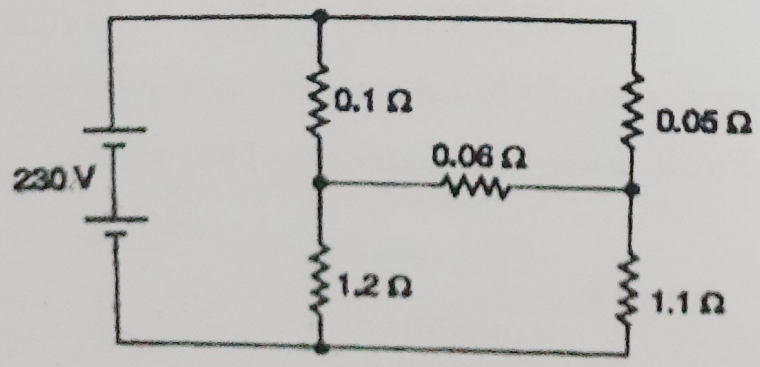
Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed.***

SECTION – A (24 Marks)

Attempt any **four** *questions out of* **five.**
Each question carries **06** *marks.*

1. Prove that Kirchoffs current law is based on law of conservation of charge. For the circuit shown in Figure, determine the current using branch currents using Krchoffs law.



P.T.O.

2. What are Q-factor and bandwidth? Discuss the significance of bandwidth for a filter circuit.

3. Describe the construction and working of MI type voltmeter. Discuss the range extension of voltmeter.

4. How will you design an 'n' phase ac generator? Discuss your design details and working of this generator.

5. Discuss the factors considered in construction of transformers. A single phase transformer has a core whose cross section area is 0.015 m^2; it operates at a maximum flux density of 1.2 Wb/m^2 from a 50Hz supply. If the secondary winding has 15 turns. Determine the current in the secondary if a load of 10Ω is connected to the output.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**
Each question carries **10** *marks.*

6. ----------

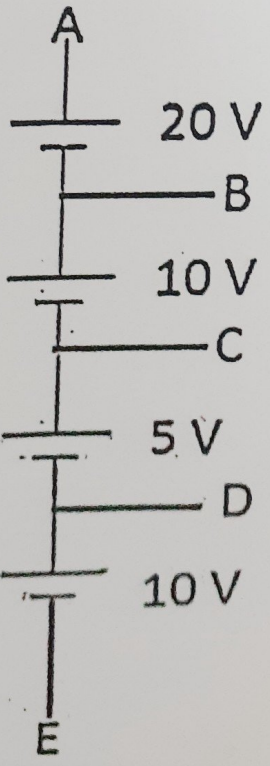
7. Discuss the significance of rms value of alternating current. Two alternating currents represented by the equations $i_1 = 7 \sin \omega t$ and $i_2 = 10 \sin (\omega t + 60°)$ are fed into a common conductor. Find the equation for the resultant current.

8. Describe 2 wattmeter method. Prove that in two wattmeter method $W_1 + W_2 = i_R e_R + i_Y e_Y + i_B e_B$.

SECTION – C (16 Marks)

(Compulsory)

9. (a) Describe the construction and working of a single phase dynamometer wattmeter. Prove that the reading of this instrument indicates power consumed by the load. (8)



P.T.O.

What is relative potential? Calculate voltages V_{AB}, V_{AC}, V_{AD}, V_{AE}, V_{BC}, V_{CD}, V_{DE}, V_{ED}, V_{EC}, V_{EB} and V_{EA}.

(b) Derive the emf equation for a transformer coil. The maximum flux density in the core of a 250/3000V, 50Hz single phase transformer is 1.2 Wb/m^2. If the emf per turn is 8V, determine primary and secondary turns, and area of the core. (8)