

Basic Electrical Lab Quiz

Course Code: EEL101

Instructions:

All questions are mandatory

Total Marks: 100

All questions carry **1** mark each except for the questions **9,46,47,50,54** which will be of **9** marks each

Duration: 75 Mins

1. An induction motor with following name plate details is given:
 Rated voltage (Line to Line): 415 Volts
 Rated Current : 4.3 Amps
 Power Rating : 2.2 HP
 RPM : 1480 RPM
 Frequency : 50 Hz
 Insulation class : F
 Blocked rotor test has to be performed on the given motor, so which of the following parameters will be used to perform the blocked rotor test.
 a.) 415 Volts b.) 2.2 HP c.) 4.3 Amps d.) 50 Hz e.) 1480 RPM

2. While performing speed control of shunt DC motor using armature control and field control following statements are given:
 I. As armature voltage will increase speed will also increase.
 II. Speed will increase when field current will increase.
 Which of the following option is the correct one?
 a.) Both I and II are false b.) I is true but II is false c.) I is false but II is true
 d.) Both are true e.) None of the option is correct

3. For a 5 KVA 230/460V three phase transformer having star-delta connection, where star is the HV side and delta connection is the LV side, 400 Volts line to line voltage is applied on the low voltage side. What will be the value of phase voltage on both HV and LV sides?
 a.) 400V and 800V b.) 230V and 460V c.) 400V and 400V d.) 460V and 460V
 e.) None of the above.

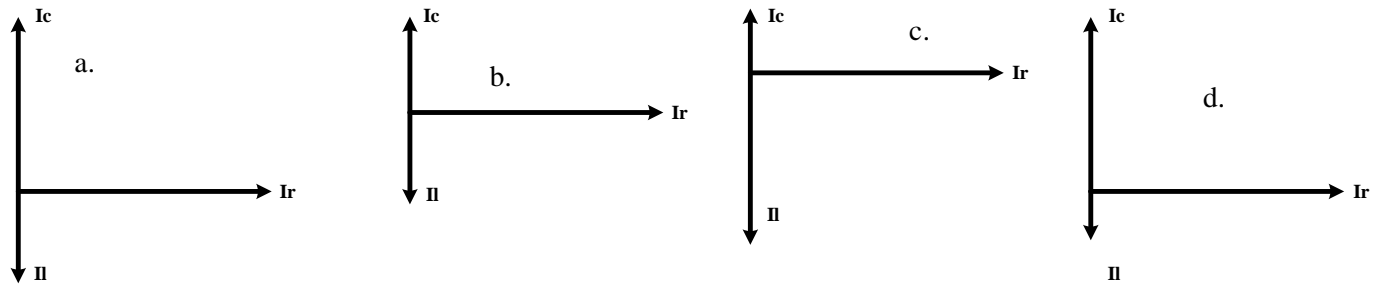
4. While performing speed control of DC motor using armature control and field control two rheostats are connected in field and armature respectively. Following is the status of both rheostats
 I. Rheostat connected in the field winding should be in maximum at the starting.
 II. Rheostat connected in the armature should be in the minimum.
 Which of the following option is right one?
 a.) Both I and II are correct b.) Both I and II are incorrect c.) I is correct but II is incorrect
 d.) Rheostats can be at any position e.) I is correct and II is irrelevant.

5. For an R-L-C series circuit which of the following action to be taken to achieve a unity power factor in the circuit,
 a.) By keeping the value of capacitive reactance greater than the inductive reactance.
 b.) By keeping the value of resistance and inductive reactance equal.
 c.) By keeping the value of inductive reactance greater than the capacitive reactance.
 d.) By keeping the value of inductive reactance equal to the capacitive reactance.
 e.) It is not possible to achieve unity power factor in series RLC circuit.

6. In a 2 KVA 415/110 Volt single phase transformer a DC voltage of amplitude 220 Volts is applied on the high voltage side of the transformer. What will be the amplitude of the voltage on the LV side for an open circuit on the LV side?
 a.) 58.31 Volts
 b.) 110 Volts
 c.) Cannot be determined as information is missing
 d.) Zero volts

e.) None of the above.

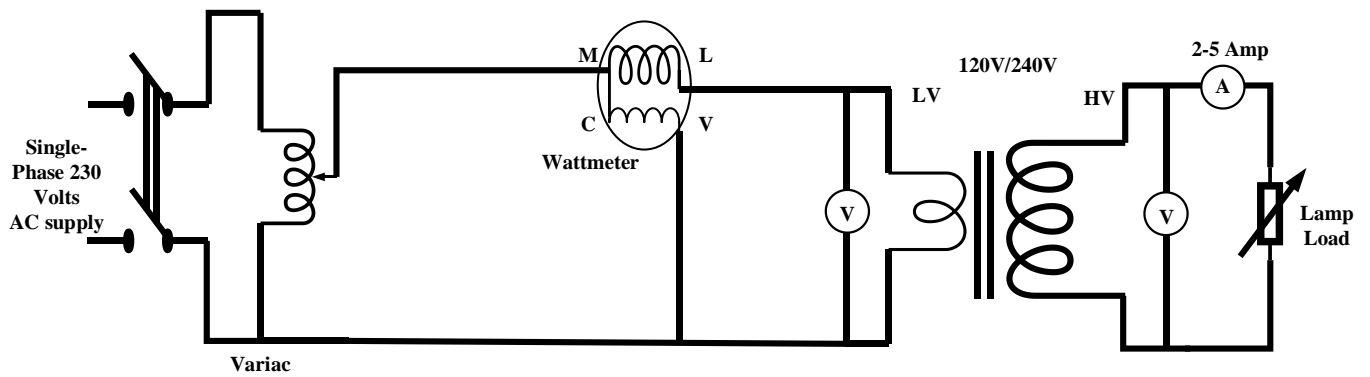
7. Which of the following phasor shows the maximum value of the power factor,



e. None of the above.

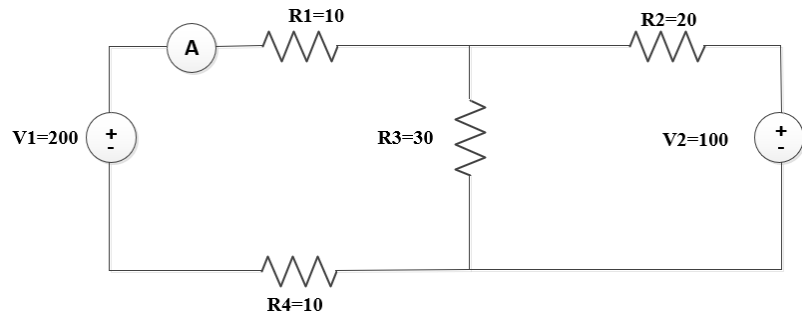
Where I_r , I_i and I_c are currents through the resistor, inductor and capacitor respectively when connected across the same AC supply individually.

8. While performing load test in the circuit given below the wattmeter reads 960 watts while a voltage of 120 Volts is applied on the primary side and lamps are on at the secondary side. The ammeter on the HV side will show what value of the current. Rating of the transformer is given as 2 KVA, 240/120V and 8.3/16.6 Ampere.



- a.) 8 Amps
- b.) 16 Amps
- c.) 4 Amps
- d.) 2 Amps
- e.) None of the above

9. What should be the range of ammeter to be chosen for the circuit given below.



- a.) 0-5 Amps
- b.) 0-2 Amps
- c.) 0-1 Amps
- d.) 0-100 mA

e.) Both b and c are suitable.

10. In the context of open circuit test and short circuit test which of the following statements are correct?

I.) Measuring equipments to be installed on the HV side of the transformer for open circuit test.

II.) Measuring equipments to be installed on the LV side of the transformer for open circuit test.

III.) Measuring equipments to be installed on the HV side of the transformer for short circuit test.

IV.) Measuring equipments to be installed on the LV side of the transformer for short circuit test.

a.) I and IV are correct.

b.) I and III are correct.

c.) II and III are correct.

d.) II and IV are correct.

e.) None of the above.

11. Which of the following losses are negligible in blocked rotor test?

a.) Mechanical losses

b.) Iron losses

c.) Both 1 & 2

d.) None of the above

12. During open circuit test of a transformer?

a.) Primary is supplied with rated voltage

b.) Primary is supplied with full-load current

c.) Primary is supplied with current at reduced voltage

d.) Primary is supplied with rated kVA

13. Transformer rating is given in _____

a.) kVA

b.) HP

c.) kVAR

d.) kW

14. While thevenizing a circuit between two terminals, V_{th} is equal to

a.) Short circuit terminal voltage

b.) Open circuit terminal voltage

c.) Net voltage available in the circuit

d.) E.M.F. of the battery nearest to the terminals

15. Thevenin's theorem converts a circuit to an equivalent form consisting of

a.) A current source and a series resistance

b.) A voltage source and a parallel resistance

c.) A voltage source and a series resistance

d.) A current source and a parallel resistance

16. What is the effect of increasing the amplitude of a DC signal generated by a DC signal generator?

a.) The frequency increases

b.) The voltage level increases

c.) The waveform becomes distorted

d.) No change occurs

17. What is the main advantage of an autotransformer compared to a conventional transformer?

a.) It is smaller and lighter

b.) It can be used to adjust both voltage and current

c.) It is more efficient at low voltages

d.) It does not require an isolated secondary winding

18. What does the vertical axis of a DSO waveform represent?

a.) Frequency

b.) Peak-to-peak voltage

c.) Root mean square voltage

d.) Relative voltage

19. What is the fundamental principle behind the Superposition Theorem in circuit analysis?

a.) Analyzing circuits with multiple voltage sources independently.

b.) Simplifying complex circuits by removing components temporarily.

c.) Calculating the total current or voltage by adding individual responses.

d.) All of the above.

20. What are the limitations of the Superposition Theorem? Consider non-linear components and dependent sources.

a.) It applies only to DC circuits, not AC circuits.

b.) It cannot be used for circuits with dependent sources.

c.) It becomes inaccurate for non-linear components like diodes or transistors.

d.) None of the above.

21. What are the two key parameters of a Thevenin equivalent circuit?

a.) Thevenin Voltage gain and Thevenin current

b.) Thevenin voltage and Thevenin resistance

c.) Thevenin Impedance and Thevenin reactance

d.) Power factor and efficiency

22. How can you improve the power factor of an AC circuit with inductive loads?

a.) Increase the resistance

b.) Decrease the capacitance

c.) Add parallel capacitors

d.) Both (a) and (b)

23. Which of the following factors least affect the power factor of an AC circuit?

a.) Voltage

b.) Frequency

c.) Resistance

d.) Impedance

24. In a load test of a transformer, which of the following quantities increases as the load is increased?

a.) No-load losses

- b.) Output voltage
- c.) Copper losses
- d.) Efficiency

25. What safety precautions need to be taken when performing load tests on transformers?

- a.) Wear personal protective equipment (PPE) including rubber gloves, safety glasses, and flame-resistant clothing.
- b.) Ensure proper grounding of the transformer and test equipment to prevent potential shocks.
- c.) Never exceed the rated voltage or current limits of the transformer or test equipment.
- d.) All of the above

26. The efficiency of a transformer is maximized when

- a.) Hysteresis losses = eddy current losses
- b.) Copper losses = iron losses
- c.) Copper losses = hysteresis losses
- d.) Eddy current losses = copper losses

27. If synchronous speed is 1500 RPM, what is the speed of Induction motor?

- a.) 1450 RPM
- b.) 1500 RPM
- c.) 1600 RPM
- d.) NONE OF THE ABOVE

28. Short circuit test on transformers is conducted to determine?

- a.) Hysteresis losses
- b.) Copper losses
- c.) Core losses
- d.) Eddy current losses

29. While calculating Thevenin resistance (R_{th}), constant-current sources in the circuit are

- a.) Replaced by 'opens'
- b.) Replaced by 'shorts'
- c.) Treated in parallel with other voltage sources
- d.) Converted into equivalent sources

30. The superposition theorem is used when the circuit contains

- a.) A single voltage source
- b.) Active elements only
- c.) A number of voltage sources
- d.) Passive elements only

31. What is the primary purpose of speed control in a DC shunt motor?

- a.) To increase torque
- b.) To regulate voltage
- c.) To adjust the motor's rotational speed
- d.) To minimize current consumption

32. Which of the following methods is commonly used for speed control of a DC shunt motor?

- a.) Series resistance control
- b.) Parallel resistance control
- c.) Field weakening
- d.) Armature short circuiting

33. In speed control of a DC shunt motor using field control method, what happens to the field winding resistance as the speed increases?

- a.) Increases
- b.) Decreases
- c.) Remains constant
- d.) None of the above

34. Which of the following statements about armature resistance control method for speed control of a DC shunt motor is true?

- a.) Armature resistance is decreased to increase speed
- b.) Armature resistance is increased to decrease speed
- c.) Armature resistance has no effect on speed
- d.) Armature resistance is increased to increase speed

35. What happens to the speed of a DC shunt motor when the field current is reduced?

- a.) Speed decreases
- b.) Speed increases
- c.) Speed remains constant
- d.) Speed fluctuates

36. When applying Kirchhoff's current law (KCL) to a node in an electrical circuit:

- a.) The sum of currents entering the node equals the sum of currents leaving the node
- b.) The voltage across the node remains the constant
- c.) The resistance at the node is negligible
- d.) None of the above.

37. In Kirchhoff's voltage law experiment, what conclusion can be drawn if the sum of voltage drops across all components in a closed loop equals the sum of voltage sources?

- a.) The circuit follows Ohm's Law.
- b.) The circuit is in a state of equilibrium.
- c.) Kirchhoff's voltage law is satisfied.
- d.) There is a short circuit in the circuit.

38. In the superposition theorem, What does it means to 'turn-off' a voltage source?

- a.) Short-circuit the voltage source
- b.) Open-circuit the voltage source
- c.) Replace the voltage source with a random resistor
- d.) Replace the voltage source with an equivalent current source

39. What must be done when applying the superposition theorem to solve a circuit with multiple sources?

- a.) Replace all resistors with equivalent capacitors.
- b.) Turn off all sources except one and calculate the corresponding branch voltage or current
- c.) Remove all resistors from the circuit

d.) Apply Kirchhoff's law to each branch separately.

40. When calculating Thevenin's Resistance, what should be done to the independent sources in the original circuit?

a.) Their respective internal resistances should replace them.

b.) They should be ignored.

c.) They should be short circuited.

d.) Their equivalent current sources should replace them.

41. What is the key advantage of using the superposition theorem in circuit analysis?

a.) It simplifies complex circuits into single equivalent components.

b.) It provides a method to calculate power dissipation in circuits.

c.) It allows for easy visualization of circuit behavior.

d.) It simplifies analysis by breaking down complex problems into simpler ones.

42. In an RL circuit, what is the power factor if the phase angle between the current and voltage is 45 degrees?

a.) 0.707 lagging

b.) 0.707 leading

c.) 0.5 lagging

d.) 0.5 leading

43. In a circuit with an inductive load, at what angle should the capacitive reactive power be introduced to achieve unity power factor?

a.) 0 degrees

b.) 45 degrees

c.) 90 degrees

d.) 180 degrees

44. What is the primary purpose of conducting a no-load test on a transformer?

a.) To determine the voltage ratio of the transformer

b.) To determine the no load current and the losses occurring in the transformer when no load is connected

c.) To determine the maximum power rating of the transformer

d.) To determine the efficiency of the transformer under full load.

45. What parameter do we keep changing during a load test on a transformer?

a.) Secondary voltage

b.) Primary current

c.) Power factor

d.) Load

46. A single phase 240-volt 50 hertz Transformer has gone in open circuit test in its low voltage side where the open circuit test data is given as follows the ammeter reading is 2 ampere wattmeter reading is 24 watt applied voltage is 240 volts then please find out the magnetizing current of that transformer.

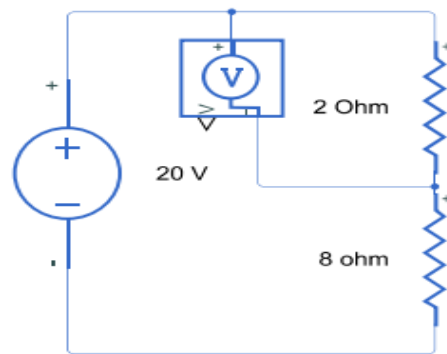
a.) 1.997A

b.) 4 A

c.) 6A

d.) 8A

47. In the given circuit if the practical voltmeter is connected across the 2 Ohm resistance whose internal resistance is 10k ohm then please find out the measurement of the voltmeter across the two-ohm resistance.



- a.) 5V
- b.) 3.99V
- c.) 3 V
- d.) 8V

48. During a block rotor test on an induction motor what is the primary purpose of blocking the rotor.

- a.) Measure the stator resistance
- b.) Measure the rotor resistance
- c.) Measure the locked rotor current
- d.) None of them.

49. How does increase the armature resistance affect the speed of the dc motor.

- a.) Speed increases
- b.) Speed decreases
- c.) Speed remains constant
- d.) Not affect the speed

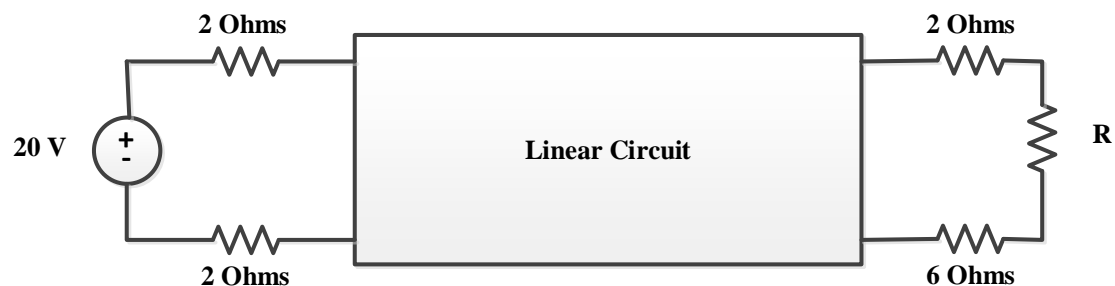
50. Consider all the elements in the black box is the linear resistive if the given measurement data of the black box is as follows.

current through the load resistance R is 10 A.

open circuit voltage across the load resistance is 30 volts.

a short circuit current through the load resistance is 3 amperes.

then please find out the magnitude of load resistance R.



- a.) 9 ohms
- b.) 7 ohms
- c.) 6 ohms
- d.) None of the above.

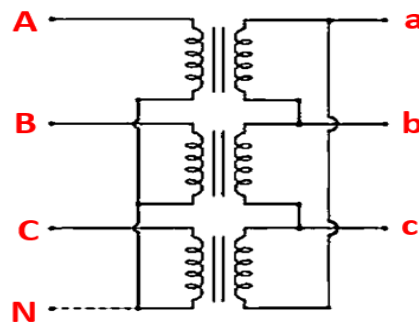
51. Internal resistance of ideal voltmeter?

- a.) 0
- b.) infinite
- c.) 1
- d.) None of the above.

52. Internal resistance of ideal ammeter?

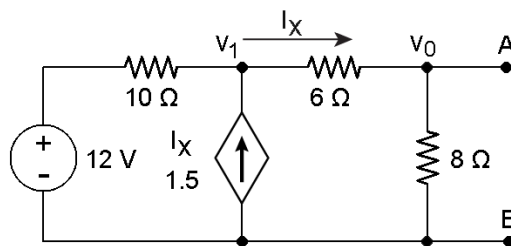
- a.) 0
- b.) infinite
- c.) 1
- d.) None of the above.

53. In the given figure for star delta connection of three phase transformer $N_1/N_2=1/2$. $V_{AB}=230V$, then $V_{ab}=\dots\dots\dots$?



$N_1:N_2$

54. The Thevenin's equivalent voltage and resistance across terminal A-B shown in the figure is _____.



55. With increase in the frequency the value of inductive reactance will:

- a.) Increase
- b.) Decrease
- c.) Remains same
- d.) All of the above

56. Which of the following is not a terminal of wattmeter?

- a.) Com
- b.) C
- c.) L
- d.) V

57. Reactive power is consumed by which element:

- a.) Diode
- b.) Capacitor
- c.) Resistor
- d.) Inductor

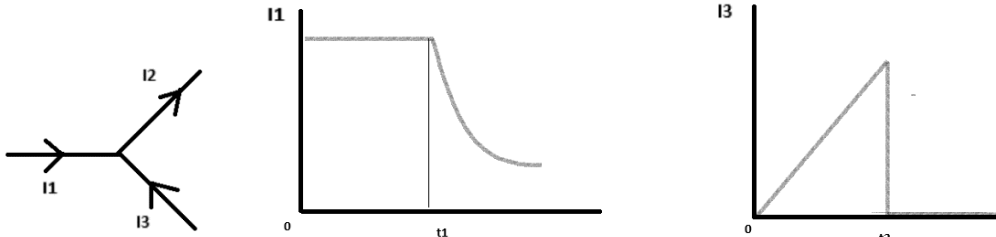
58. The value of a voltage source is changing with time as shown below

$$v(t) = V_m e^{at} + V_m e^{-bt} \quad a > b > 0$$

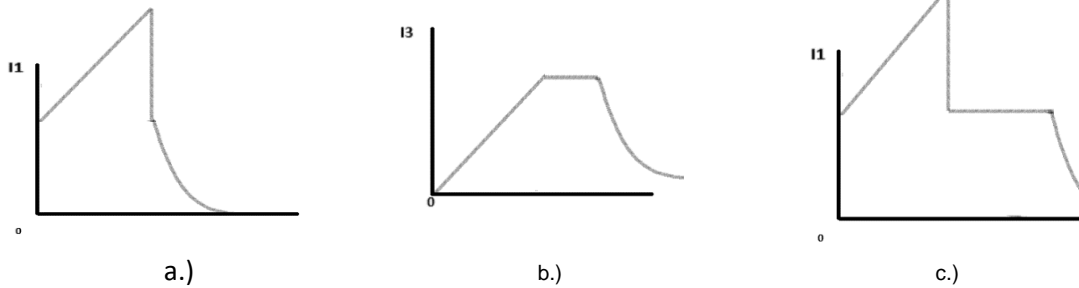
The value of Thevenin's resistance will

- a.) Increase
- b.) Decrease
- c.) Remains same
- d.) First increase then decrease

59. For a linear resistive network, the profile of the currents and nature of currents I_1 and I_3 are given as follows:



What will be the nature of the I_2 then?



d.) None of the above.

60. State superposition theorem. Can we use superposition theorem for power calculation? Explain it.