BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

1st In-Sem. Examination

Course Code: ELE1304 **Time: 1 Hour**

Course Name: Electrical Measuring Instruments **Max. Marks: 20**

Instruction: Answer all questions from section A. Each question carries one mark. Answer all questions from section B, each question carries two marks. Answer all questions from section C, each question carries three marks. Scientific calculator is allowed.

Section – A

05X01 = 05 Marks

1. Resistances can be measured with the help of a .....
   (a) Wattmeter (b) Voltmeter (c) Ammeter (d) Ohmmeter
2. The household energy meter is ...
   (a) An indicating instrument
   (b) A recording instrument
   (c) An integrating instrument
   (d) None of the above
3. The pointer of an indicating instrument is generally made of:
   (a) Copper (b) Aluminum (c) Silver (d) Soft steel
4. What is the international system of units called?
   (a) Well defined units (b) The metric units
   (c) System units (d) IS units
5. The standard units for measuring the frequency of a sound wave is
   (a) Meter/second (b) Newton
   (c) Meter (d) Hertz

Section – B

03X02 = 06 Marks

1. Write down the advantages of Electrical Measuring Instruments
2. What is Electrical Measurement System?
3. Write down the classification of measuring instruments

Section – C

03X03 = 09 Marks

1. List the various advantages and disadvantages of calibration in measuring instruments.
2. Draw the block diagram of Electrical Measuring System.
3. Write down the name of international systems of units

Answer Key

Course Code: ELE1304,

Course Name: Electrical Measuring Instruments

School of Electrical Skills, Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester, 1st In-Sem. Examination

Section – A

1. D
2. B
3. B
4. B
5. D

Section – B

03X02 = 06 Marks

1. Write down the advantages of Electrical Measuring Instruments

   Advantages of Electrical Measuring Instruments:

2. They are reliable all the times
3. They are more power efficient
4. They are more portable in the sense
5. They can be moved around easily
6. They can be used in a variety of power supply all over the world.

2. What is Electrical Measurement System?

   This post covers types of electrical measurement systems. Every engineering task requires the measurement of some **physical quantity and converting it to an electrical quantity**. The devices that can help in these tasks are sensors and transducers. Sensors usually convert the change of physical quantity to the change of electrical quantity, and in many cases, there are additional manipulations that are needed between the sensor and output.

3. Write down the classification of measuring instruments

   Classification of Measuring Instruments:

   The instrument used for measuring the physical and electrical quantities is known as the measuring instrument.
   The measuring instrument categorised into three types;

- Electrical Instrument
- Electronic Instrument
- Mechanical Instrument

Answer Key

Course Code: ELE1304,

Course Name: Electrical Measuring Instruments

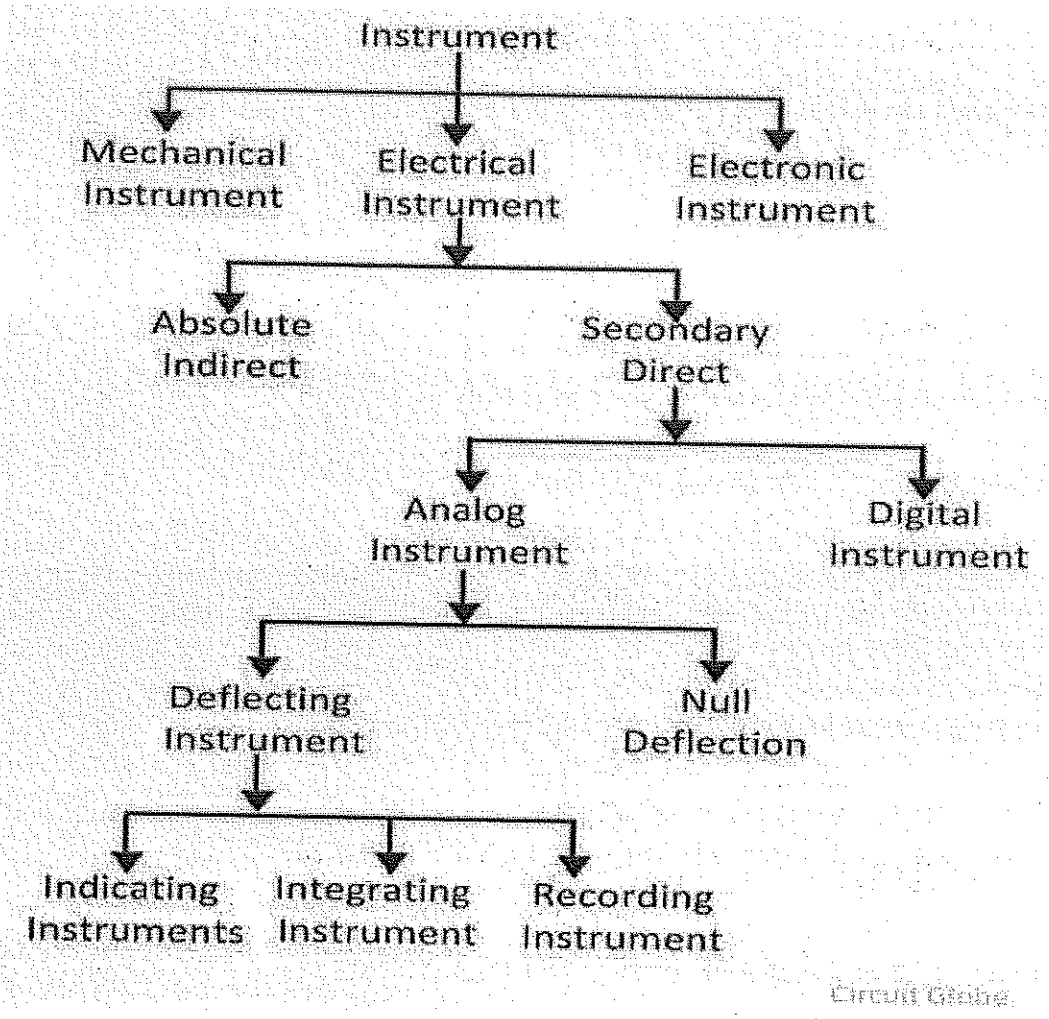
School of Electrical Skills, Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester, 1st In-Sem. Examination

Electrical Instrument: The electrical instrument is used for measuring electrical quantities likes current, voltage, power, etc. The ammeter, voltmeter, wattmeter are the examples of the electrical measuring instrument.

Electronic Instrument: The electronic instrument has quick response time. The instrument provides the quick response as compared to the electrical and mechanical instrument.

Mechanical Instrument: **The mechanical instrument uses for measuring the physical quantities.** This instrument is suitable for measuring the static and stable condition because the instrument is unable to give the response to the dynamic condition.



Answer Key

Course Code: ELE1304,

Course Name: Electrical Measuring Instruments

School of Electrical Skills, Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester, 1st In-Sem. Examination

Section – C

03X03 = 09 Marks

1. What is the advantages and disadvantages of calibration

   Advantages

   Servicing Proficiency
   Quality Control
   Reduces Chances of Error
   Cost Effective Auditing
   Easy Tracking

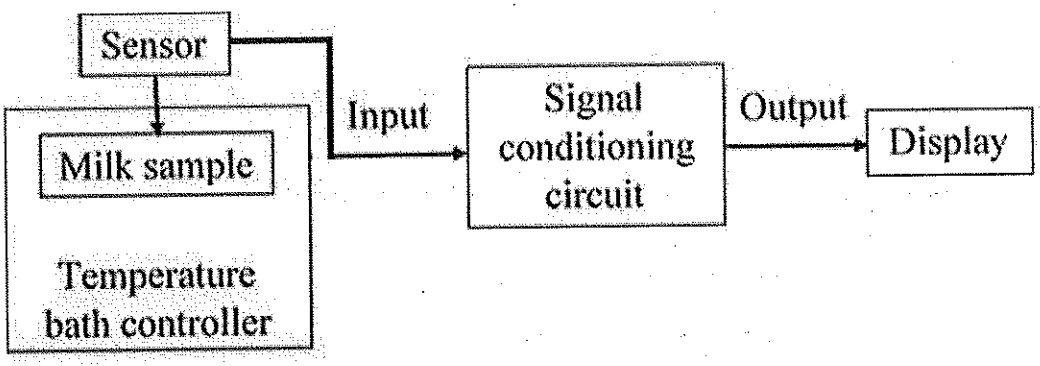
   Disadvantages

   Entire loop is not verified within tolerance.

   Mistakes on re-connect.

   Less efficient use of time to do one calibration for each loop instrument as opposed to one calibration for the loop.

2. Draw the block diagram of Electrical Measuring System.



3. Write down the name of international systems of units

   International System Units:
   International System of Units (SI), French System International units, international decimal system of weights and measures derived from and extending the metric system of units. Adopted by the 11th General Conference on Weights and Measures (CGPM) in 1960, it is abbreviated SI in all languages.

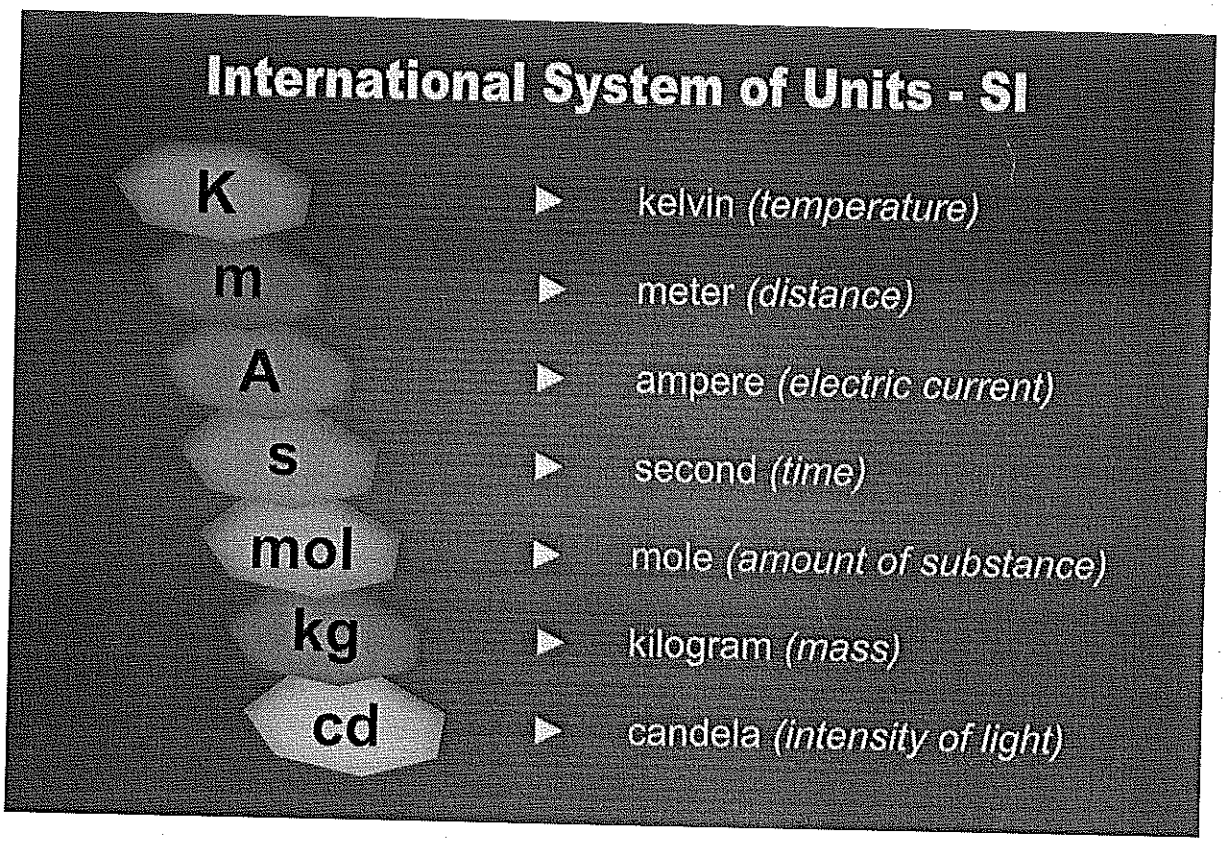
Answer Key

Course Code: ELE1304,

Course Name: Electrical Measuring Instruments

School of Electrical Skills, Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester, 1st In-Sem. Examination



Quantity	Name of Unit	Symbol	Quantity
Length	meter	m	*l*
Mass	kilogram	kg	*m*
Time	second	s	*t*
Electrical current	ampere	A	*I, i*
Thermodynamic temperature	Kelvin	K	*T*
Luminous intensity	candela	cd	*Iv*
Amount of substance	mole	mol	*n*

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

1st In-Sem. Examination

Course Code: ELE1305 **Time: 1 Hour**

Course Name: Introduction to Power System **Max. Marks: 20**

Instruction: Answer all questions from section A, each question carries one mark. Answer all questions from section B, each question carries two marks. Answer all questions from section C, each question carries three marks. Scientific calculator is allowed.

Section – A

05X01 = 05 Marks

1. Solar is a type of :
   (a) Conventional Source of Energy (b) Non- Conventional Source of Energy
   (c) Non- Renewable Source of Energy (d) None of the above

2. The heart of Power System is :
   (a) Generator (b) Transmission line
   (c) Distribution system (d) Consumers

3. "Transformer is a component which is used to change the voltage level without changing frequency". True or False
   (a) True (b) False

4. When voltage level is more than 765KV than it is known as
   (a) High voltage (b) Extra High Voltage
   (c) Ultra High Voltage (d) Medium Voltage

5. To convert steam into water again which component is used in Thermal Power Plant
   (a) Boiler (b) Draft Fan (c) Condenser (d) None of them

Section – B

03X02 = 06 Marks

1. Define Transmission Substation.
2. Draw a neat and clean Single line diagram of Power System
3. Explain the working of following components
   (a) Superheater (b) Economiser

Section – C

03X03 = 09 Marks

1. Draw a neat and clean layout of thermal power plant with each component clearly mentioned on it.
2. What are conventional and Non Conventional Sources of Energy? Explain with Example.
3. Explain Single Line Diagram and what it is comprises of.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

1st In-Sem. Examination

Answer Key

Course Code: ELE1305 **Time: 1 Hour**

Course Name: Introduction to Power System **Max. Marks: 20**

Instruction: Answer all questions from section A, each question carries one mark. Answer all questions from section B, each question carries two marks. Answer all questions from section C, each question carries three marks. Scientific calculator is allowed.

Section – A

05X01 = 05 Marks

1. Solar is a type of :
   (a) Conventional Source of Energy
   (b) Non- Conventional Source of Energy
   (c) Non- Renewable Source of Energy
   (d) None of the above

Answer- (b) Non- Conventional Source of Energy

2. The heart of Power System is :
   (a) Generator (b) Transmission line
   (c) Distribution system (d) Consumers

Answer- (a) Generator

3. "Transformer is a component which is used to change the voltage level without changing frequency". True or False
   (a) True (b) False

Answer-(a) True

4. When voltage level is more than 765KV than it is known as
   (a) High voltage
   (b) Extra High Voltage
   (c) Ultra High Voltage
   (d) Medium Voltage

Answer-(c) Ultra High Voltage

5. To convert steam into water again which component is used in Thermal Power Plant
   (a) Boiler (b) Draft Fan (c) Condenser (d) None of them

Answer- (c) Condenser

Section – B

03X02 = 06 Marks

1. Define Transmission Substation.

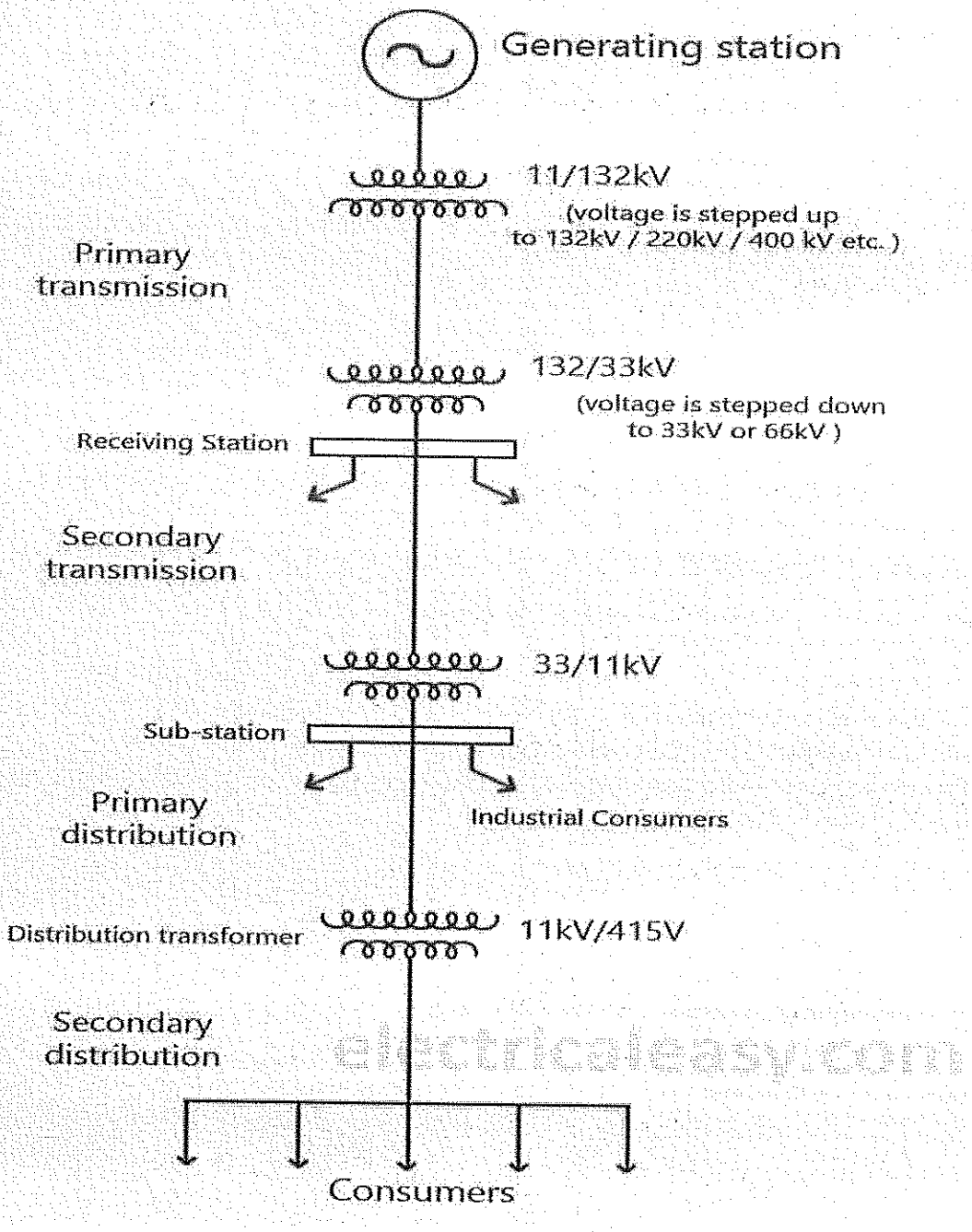
Answer- The transmission substation carries the overhead lines which transfer the generated electrical energy from generation to the distribution substations.

The transmission lines mainly perform the two functions

1. It transports the energy from generating stations to bulk receiving stations.
2. It interconnects the two or more generating stations. The neighbouring substations are also interconnected through the transmission lines.

The transmission voltage is operating at more than 66KV and is standardised at 69KV, 115KV, 138KV, 161KV, 230KV, 345KV, 500KV, and 765KV, line-to-line. The transmission line above 230KV is usually referred to as extra high voltage (EHV).

3. Draw a neat and clean Single line diagram of Power System



3. Explain the working of following components

(a) Superheater **(b) Economiser**

Answer- **(a) Superheater-** The superheater is one component in the boiler that serves to further heat the steam to produce steam that meets the requirements for turning turbines.The superheater is a collection of boiler pipes located in the flow of hot gas from combustion. The heat from this gas is transferred to Saturated Steam in the superheater pipe, so it turns into superheated steam.

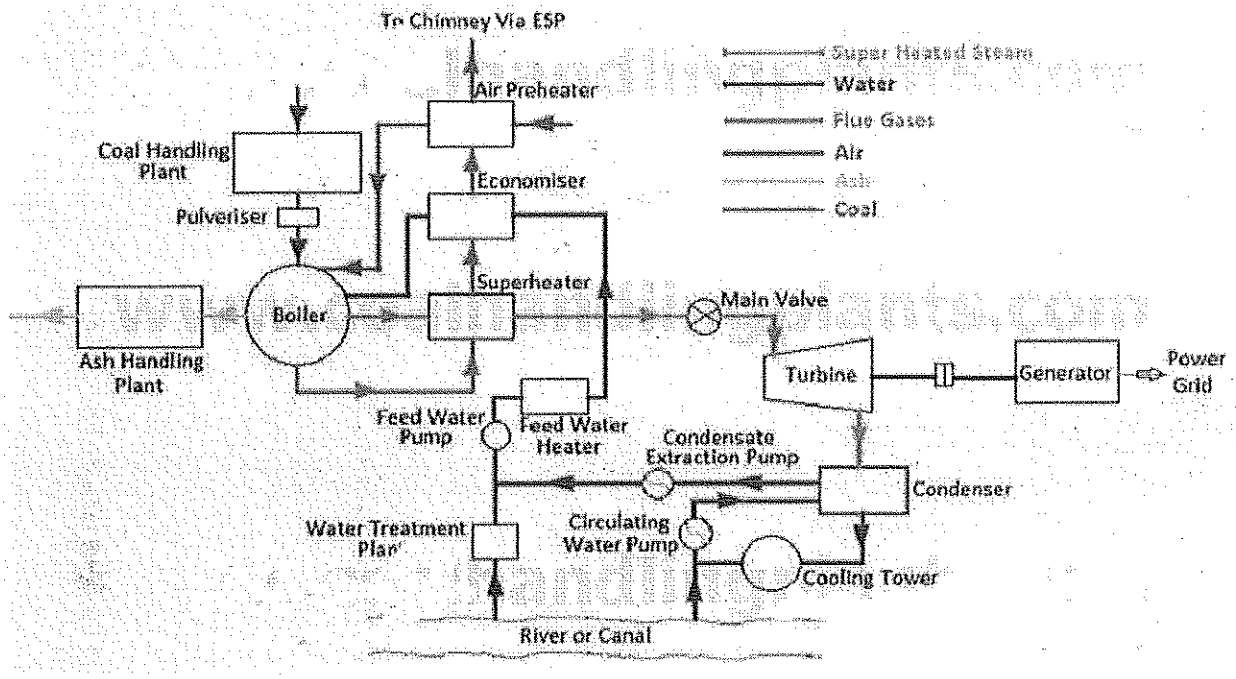
(b) **Economizer-** Function of economiser in thermal power plant is to recover some of the heat from the heat carried away in the flue gases up the chimney and utilize for heating the feed water to the boiler. It is simply a heat ex-changer with hot flue gas on shell side and water on tube side with extended heating surface like Fins or Gills.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Section – C

03X03 = 09 Marks

1. Draw a neat and clean layout of thermal power plant with each component clearly mentioned on it.



2. What are conventional and Non Conventional Sources of Energy? Explain with Example.

Conventional sources of energy can be described as non-renewable sources of energy which have been used since a long time.Conventional sources of energy are used extensively by mankind and the magnitude of usage is so high that the reserves have got depleted to a great extent. Example: Coal, petroleum, natural gas

Non conventional sources of energy are mostly renewable or available in abundance on earth. They are ecologically safe to use as well. Example: wind/ solar/ hydro/ geothermal energy

3. **Explain Single Line Diagram and what it is comprises of.**

Answer- The single-line diagram is the blueprint for electrical system analysis. It is the first step in preparing a critical response plan, allowing you to become thoroughly familiar with the electrical distribution system layout and design in your facility.

To give you an accurate picture of your electrical system, the single-line diagram information normally includes:

- Incoming lines (voltage and size)
- Incoming main fuses, potheads, cutouts, switches and main/tie breakers
- Power transformers (rating, winding connection and grounding means)

- Feeder breakers and fused switches
- Relays (function, use and type)
- Current/potential transformers (size, type and ratio)
- Control transformers
- All main cable and wire runs with their associated isolating switches and potheads (size and length of run)
- All substations, including integral relays and main panels and the exact nature of the load in each feeder and on each substation
- Critical equipment voltage and size (UPS, battery, generator, power distribution, transfer switch, computer room air conditioning)

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. ELE Program, III Semester,

1st In-Sem. Examination

Course Code: ELE 1306 **Time: 1 Hour**

Course Name: Electrical Machines-I **Max. Marks: 20**

Instruction: Answer all questions from each and every section. Section A, each question carries one mark, section B, each question carries two marks and in section C, each question carries three marks. Scientific calculator is allowed.

Section – A

05X01 = 05 Marks

1. Motor is a machine which converts
   a) Mechanical Energy into Electrical Energy b) Electrical Energy into Mechanical Energy
   c) Both A&B d) None of these
2. What is the coupling field used between the electrical and mechanical systems in energy conversion devices?
   a) Magnetic field b) Electric field
   c) Magnetic field or Electric field d) None of the mentioned
3. Efficiency means
   a) Output Power /Input power b)Input Power/Output Power
   c) Both A&B d) None of these
4. Coil resistance of the DC shunt motor is
   (a) High (b) Good (c) Average (d) None of these

Section – B

03X02 = 06 Marks

1. Define DC machines and also write the names of the two windings in DC motor.
2. Define Induction Motor.
3. What is the value of synchronous speed of the motor if the number of poles of a motor is P=6?

Section – C

03X03 = 09 Marks

1. Describe the principle of energy conversion. From a consideration of the various energies involved, develop the model of an electromechanical energy conversion device.
2. Compare the different types of DC motor.
3. Explain the DC series motor with the circuit diagram of it.

BSDU

CLE1506 **Answers Key** Electrical Machine-I

Course Code: ELE1505, Course Name: Advance Automation and Control
School of Electrical Skills, Session: 2021-22 (Summer Semester)
B. Voc. Program, Vth Semester, 1st In-Sem. Examination

Section – A

05X01 = 05 Marks

1. Motor is a machine which converts
   b) Electrical Energy into Mechanical Energy
2. What is the coupling field used between the electrical and mechanical systems in energy conversion devices?
   c) Magnetic field or Electric field
3. Efficiency means
   a) Output Power /Input power
4. Coil resistance of the DC shunt motor is
   (a) High

Section – B

03X02 = 06 Marks

1. Define DC machines and also write the names of the two windings in DC motor.

   DC Motor: motor that runs on direct current (DC) electricity.
   Armature winding and field winding

2. Define Induction Motor.

The machine which converts the AC electric power into mechanical power by using an electromagnetic induction phenomenon in called an induction motor. The induction motor is mainly classified into two types., i.e., the single phase induction motor and the three phase induction motors.

3. What is the value of synchronous speed of the motor if the number of poles of a motor is P=6?
   Ans: N= 120f/P

Section – C

03X03 = 09 Marks

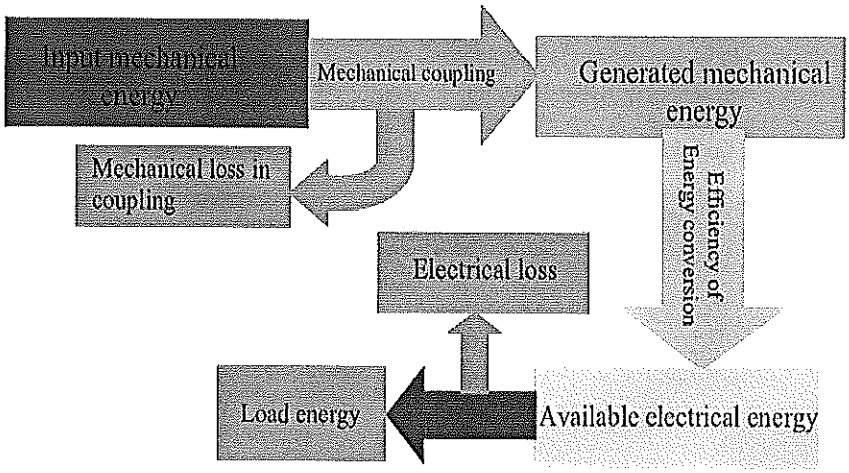
1. Describe the principle of energy conversion. From a consideration of the various energies involved, develop the model of an electromechanical energy conversion device.
   Electromechanical energy conversion is a conversion of mechanical energy into electrical energy (generator) or vice-versa (motor) with the aid of rotary motion (rotary machines) or translatory (linear) motion (linear machines and actuators)

   An electromagnetic machine is one that links an electrical energy system to another (mechanical) energy system by providing a reversible means of energy flow via its magnetic field

   • The magnetic field is therefore the coupling between the two systems and is the mutual link for electro-mechanical energy conversion

Answers Key

Course Code: ELE1505, Course Name: Advance Automation and Control
School of Electrical Skills, Session: 2021-22 (Summer Semester)
B. Voc. Program, Vth Semester, 1st In-Sem. Examination



2. Compare the different types of DC motor.

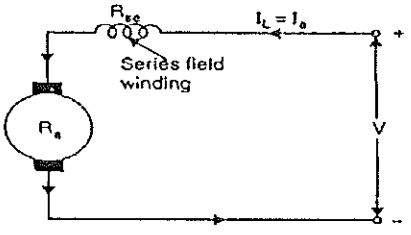
Comparison of DC motors

TYPE OF DC MOTOR	COIL RESISTANCE	SPEED CONTROL	STARTING TORQUE
SERIES	LOW	POOR	HIGH
SHUNT	HIGH	GOOD	AVERAGE
COMPOUND	PARALLE HIGH + SERIES LOW	AVERAGE	AVERAGE

3. Explain the DC series motor with the circuit diagram of it.

DC SERIES MOTOR

- The field winding is connected in series with the armature.
- The current passing through the series winding is same as the armature current .
- Therefore the series field winding has fewer turns of thick wire than the shunt field winding.
- Also therefore the field winding will posses a low resistance then the armature winding.



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

1st In-Sem. Examination

Course Code: ELE1307 **Time: 1 Hour**

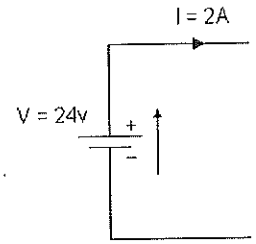
Course Name: Electric Circuit & Drawing **Max. Marks: 20**

Instruction: Answer all questions from section A, each question carries one mark. Answer all questions from section B, each question carries two marks. Answer all questions from section C, each question carries three marks. Scientific/Normal calculator is allowed.

Section – A

05X01 = 05 Marks

1. Power delivered by the voltage source 24 volts_____



(a) -48 Watt (b) 24 Watt (c) 48 Watt (d) None of these

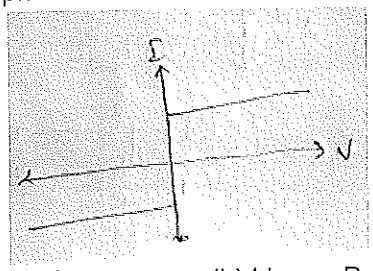
2. KVL works on the principle of:

(a) Charge conservation (b) Energy conservation
(c) Power conservation (d) None of these

3. Unit of Power is:
(a) Kwh (b) Joules (c) Watt-Hour (d) None of these

4. Transformer is a:
(a) Active device (b) Passive device
(c) Rotating device (d) None of these

5. Characteristics of given graph is:



(a) Non-linear, Active, Unilateral (b) Linear, Passive, Bilateral
(c) Non-linear, Passive, Unilateral (d) None of these

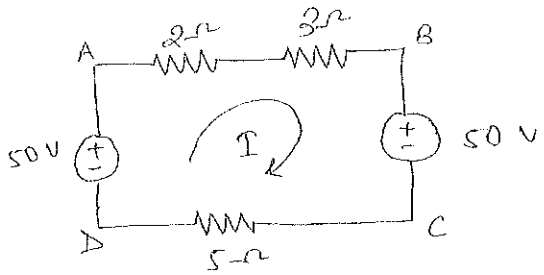
Section – B

03X02 = 06 Marks

1. State the law of conservation of energy and also define conditions when current will flow in a circuit.

2. State the Kirchhoff's laws.

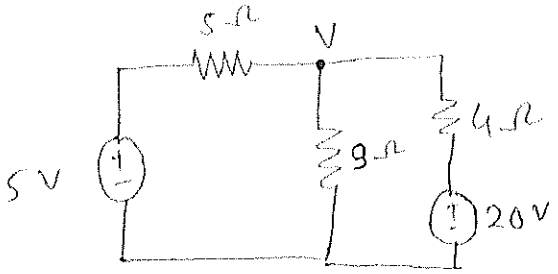
3. Calculate the value of I shown in the given figure.



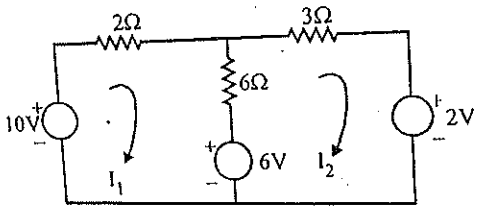
Section – C

03X03 = 09 Marks

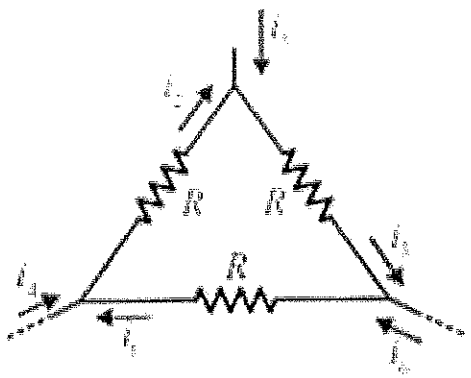
1. Using Nodal Analysis, find current in the 9Ω resistance from the given circuit.



2. Find current values of I_1 & I_2 shown in given figure using mesh analysis.



3. Calculate the current I_2, I_3, I_6 when I_1= 2A; I_4= -1A; I_5= -4A, using KCL.



Answer Key – Set – A

Course Code: ELE1303, Course Name: Electric Circuit & Drawing

School of Electrical Skills, 3rd Semester, 1st In-Sem. Examination

B. Voc. Program, Summer Semester (2021-22)

Section - A

A.1 c

A.2 b

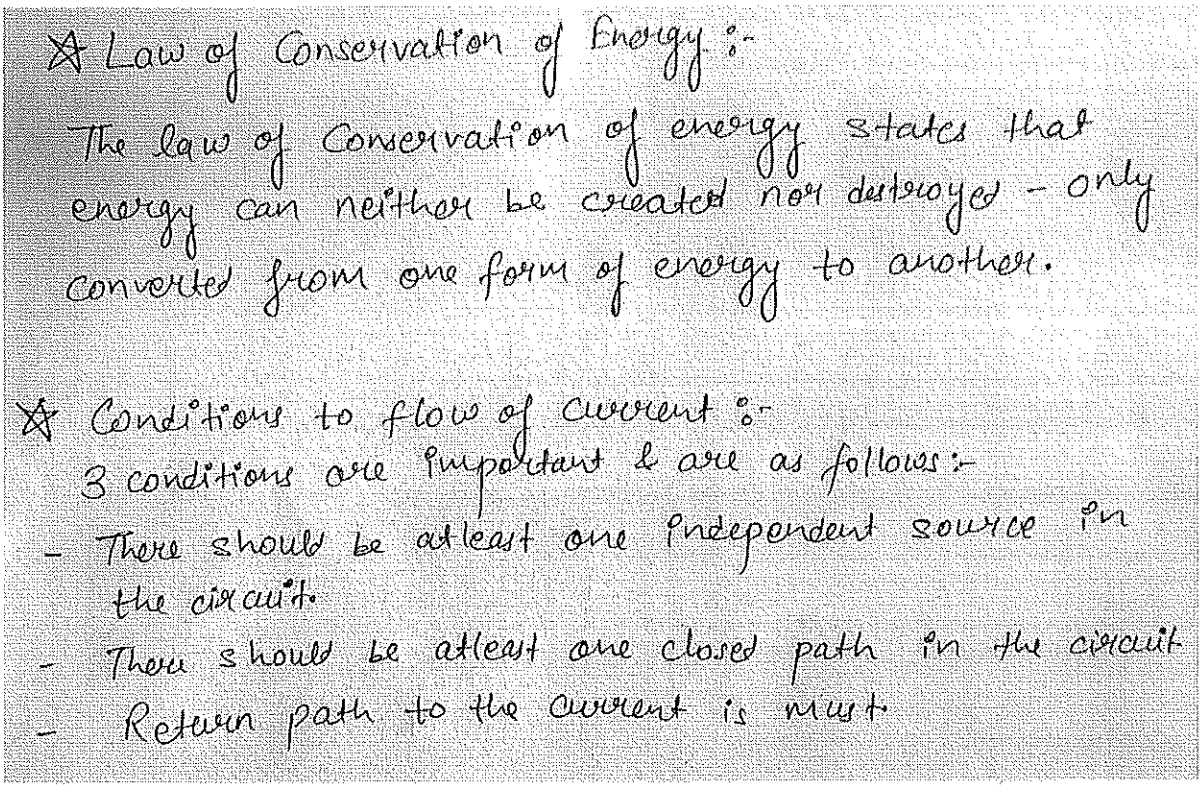
A.3 d

A.4 b

A.5 d

Section-B

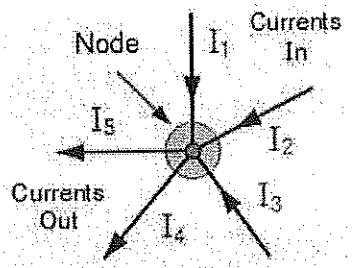
Ans.1



Ans.2 Kirchhoff's Law Statement

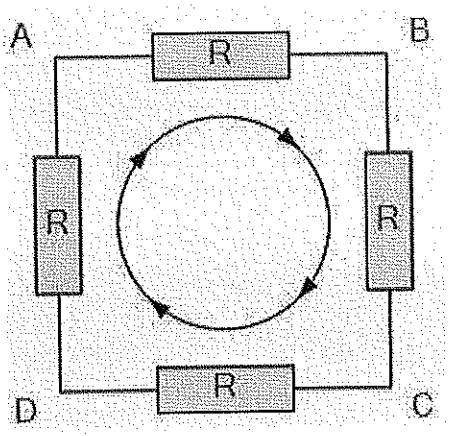
Kirchhoff's laws are one of the fundamental laws that find applications in electrical engineering for formulating the circuits. There are two laws that make up the Kirchhoff's law and they are:

- **Kirchhoff's Current Law (KCL):** KCL is also known as Kirchhoff's first law or junction rule. The principle of this law is to conserve the electric charge. The law states that the amount *of current flowing into a node/junction is equal to the sum of currents flowing out of it.* For performing the nodal analysis in Ohm's law, KCL is used.



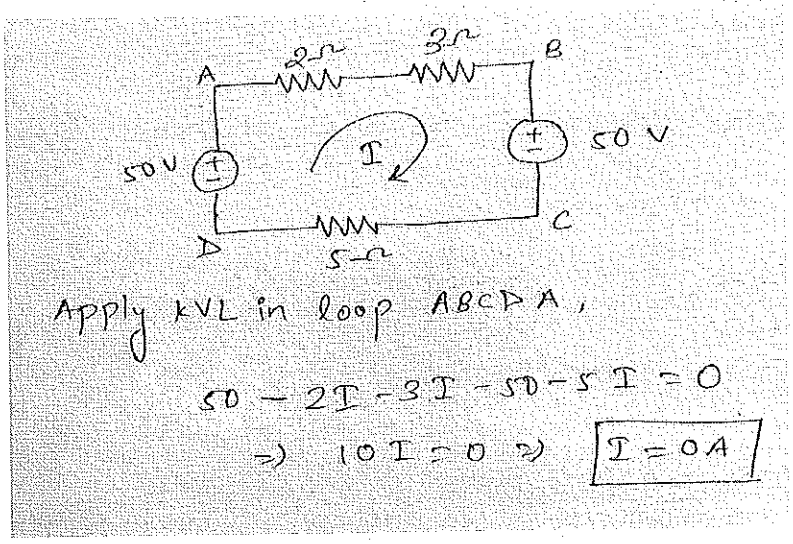
$$I_1 + I_2 + I_3 + (-I_4 + -I_5) = 0$$

- **Kirchhoff's Voltage Law (KVL):** KVL is also known as Kirchhoff's second law or loop law. The principle of this law is to conserve energy. The law states that the *sum of voltages in a closed-loop is zero.* The total amount of energy gained is equal to the energy lost per unit charge.



$$V_{AB} + V_{BC} + V_{CD} + V_{DA} = 0$$

Ans.3



Answer Key – Set – A

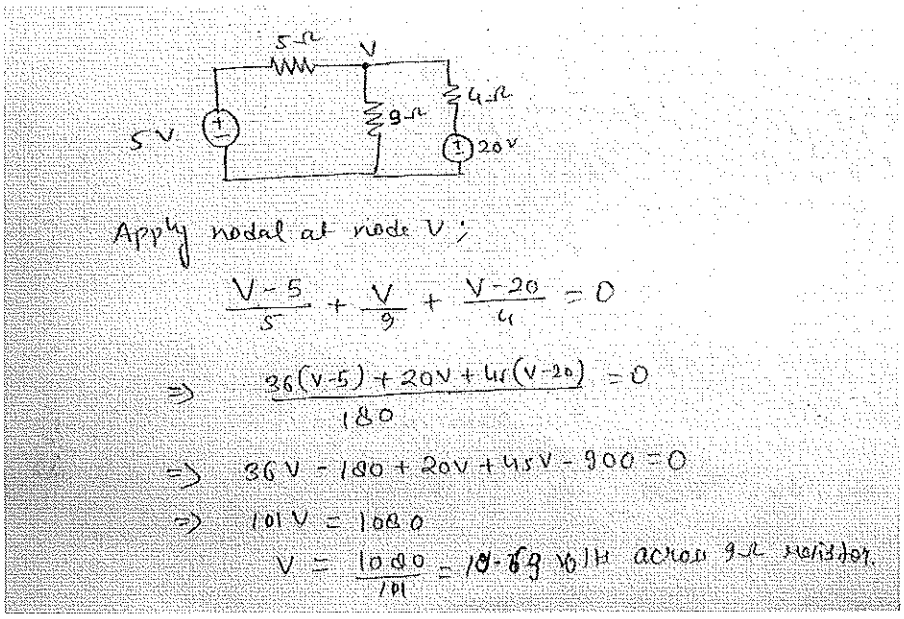
Course Code: ELE1303, Course Name: Electric Circuit & Drawing

School of Electrical Skills, 3rd Semester, 1st In-Sem. Examination

B. Voc. Program, Summer Semester (2021-22)

Section-C

Ans.1



Apply nodal at node V;

$$\frac{V-5}{5}+\frac{V}{9}+\frac{V-20}{4}=0$$

$$\Rightarrow \frac{36(V-5)+20V+45(V-20)}{180}=0$$

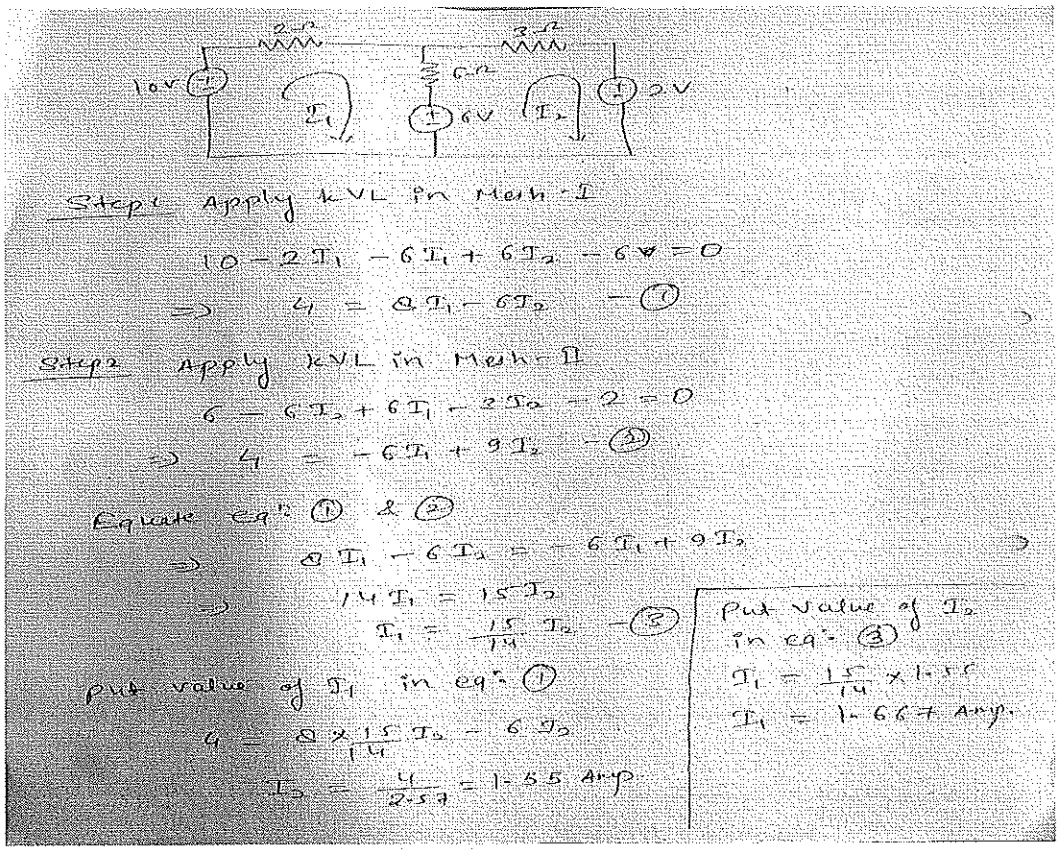
$$\Rightarrow 36V-180+20V+45V-900=0$$

$$\Rightarrow 101V=1080$$

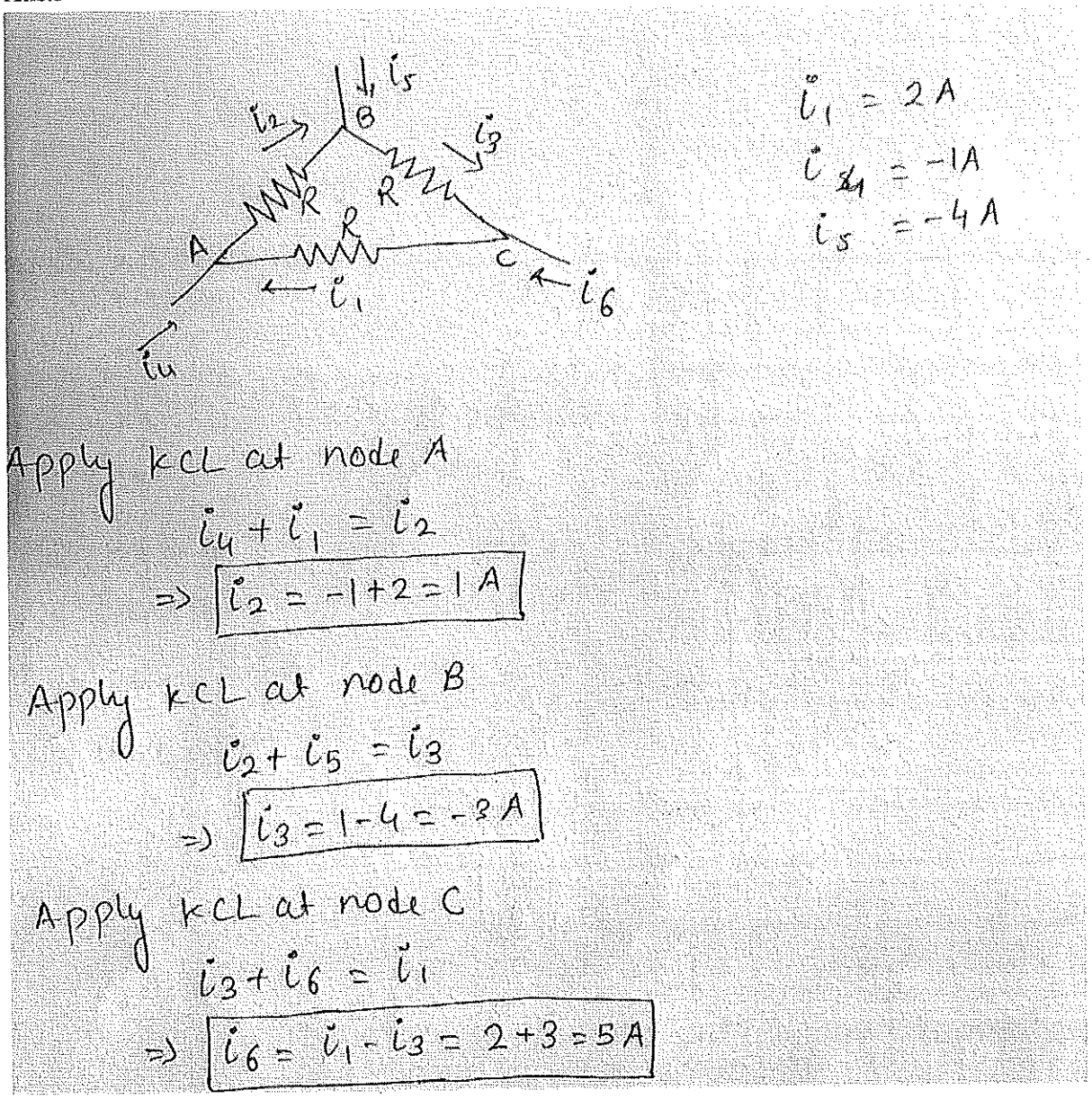
$$V=\frac{1080}{101}=10.69 \text{ volt across 9Ω resistor}$$

Current in 9-ohm resistor = V/9= 10.69/9 = 1.18 amps

Ans.2



Ans.3



$i_1 = 2\,A$

$i_4 = -1\,A$

$i_5 = -4\,A$

Apply KCL at node A

$$i_4 + i_1 = i_2$$

$$\Rightarrow \boxed{i_2 = -1 + 2 = 1\,A}$$

Apply KCL at node B

$$i_2 + i_5 = i_3$$

$$\Rightarrow \boxed{i_3 = 1 - 4 = -3\,A}$$

Apply KCL at node C

$$i_3 + i_6 = i_1$$

$$\Rightarrow \boxed{i_6 = i_1 - i_3 = 2 + 3 = 5\,A}$$