BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, III Semester,

1st In-Sem. Examination (Lateral Entry)

Course Code: ELE1301/RET 1305 **Time: 1 Hour**

Course Name: Automation and Control **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. What is the PLC?

a) Hardware b) Software

c) Language d) None of these

2. DCS stands for _____.

a) Program Logical Circuit b) Distributed Control System

c) Pneumatic Logic Controller d) None of these

3. Electromagnetic relay can be used as a _____.

a) Networking device b) Measuring instrument

c) Switching device d) None of these

4. Who originated the word "Automation" for automatic devices and controls the machines?

a) D.S. Harder b) Alexandria Heron

c) Dick Morley d) None of these

5. The father of PLC is _____.

a) Dick Morley b) Alison Dunn

c) John Moller d) None of these

Section – B

03X02 = 06 Marks

1. Explain the term hardware and software.
2. What are the applications of PLC for the automation?
3. Differentiate between the input and output devices for PLC with examples.

Section – C

03X03 = 09 Marks

1. Describe five different methods used for controlling the machine as automation.
2. Explain the needs of automation in detail.
3. Write short note on following:
   (a) Automation
   (b) Programmable Logic Controller
   (c) Architecture of Programmable Logic Controller

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03X03 = 09 Marks

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Answers Key

Course Code: ELE1301/RET1305, Course Name: Automation and Control
School of Electrical Skills, Session: 2021-22 (Summer Semester)
B. Voc. Program, III Semester, 1st In-Sem. Examination

Section – A

05X01 = 05 Marks

Ans 1. (a) Hardware
Ans 2. (b) Distributed Control System
Ans 3. (c) Switching device
Ans 4. (a) D.S. Harder
Ans 5. (a) Dick Morley

Section – B

03X02 = 06 Marks

Ans 1.

Hardware: Hardware is a physical parts computer that cause processing of data. As Hardware are physical electronic devices, we can see and touch hardware.

Software: Software is a set of instruction that tells a computer exactly what to do. We can see and also use the software but can't actually touch them.

Ans 2.

Applications of PLC:

1. Bottle filling plant
2. Mixing plant
3. Traffic light control
4. Packing industries
5. Manufacturing industries
6. Smart power system
7. Chemical plant etc.

Ans 3. PLC I/O is the part of the PLC that connects the brain of the PLC, the CPU, to the outside world, the machines. In a PLC system there will usually be dedicated modules for inputs and dedicated modules for outputs. An input module detects the status of input signals such as push-buttons, switches, temperature sensors, etc. An output module controls devices such as relays, motor starters, lights, etc.

Section – C

03X03 = 09 Marks

Ans 1.

1. Manual Controlling: In manual control system, the process operator observes the process condition and controls the system by doing manual adjustments. Heron of Alexandria, a Greek mathematician, invented the first automatic door, which could open the gates to the city using a series of ropes and pulleys.

2. Pneumatic Controlling: A pneumatic system is a collection of interconnected components using compressed air to do work for automated equipment. in this case the use of a gaseous media under pressure to generate, transmit and control power; typically using compressed gas such as air at a pressure of 60 to 120 pounds per square inch (PSI). Hydraulics is another form of fluid power, which uses a liquid media such as oil but at a much higher pressure with a typical range of 800 to 5000 PSI. EX. Hydraulic gates

3. Hard wire controller: Hard-wired means the electrical cable is physically connected or wired into the household wiring. Ex. Hard wired counter, timer etc.

4. Electric logic gate controller: A logic gate is an idealized or physical device implementing a Boolean function that, performs a logical operation on one or more binary inputs and produces a single binary output.

5. PLC: A PLC is a Programmable Logic Controller. In other words, it is an industrial computer used as a standalone unit and can be used in a network of PLCs to automatically control a process or perform a specific function.

Ans 2.

Need and role of automation:

1. Reduce Worker Fatigue and Effort or Labour Intensive Operation: Typically, humans dislike banal, repetitive tasks. However, computer systems perform them without complaint.

2. Prevent Products or Materials from Being Damaged or Destroyed: Humans make mistakes when they fatigue. This embodies the sentiment of the "human condition." Mistakes using tools mean damaging raw materials, components, assemblies, and end products.

3. Prevent Non-Conforming Product from Shipping: Computers controlling robots do not forget steps. Neglecting to put in a screw requires a human touch.

4. Increase Efficiency: Improving processes for efficiency makes a company more competitive, but do people always do the same thing, in the same way, every time they do it? No, human variation exists. Automated systems allow for improvements that benefit from consistent execution.

5. Collect Better Data: Remove the accidental data entry or missed data point from logging. Different sensors regulate it.

6. Improve Metrics: Sending reliable data directly to a database provides an ongoing resource. Correlation of associated process data with pass/fail records provides insight rather than guessing "what is causing this?".

7. Devise the Right Process Improvements: Automated systems now collect reliable data. The database provides a searchable forum. It makes "continuous improvement," make changes with better information.

8. Save Money: Cost savings through making processes more regular and collecting data for making confident decisions.

Answers Key

Course Code: ELE1301/RET1305, Course Name: Automation and Control
School of Electrical Skills, Session: 2021-22 (Summer Semester)
B. Voc. Program, III Semester, 1st In-Sem. Examination

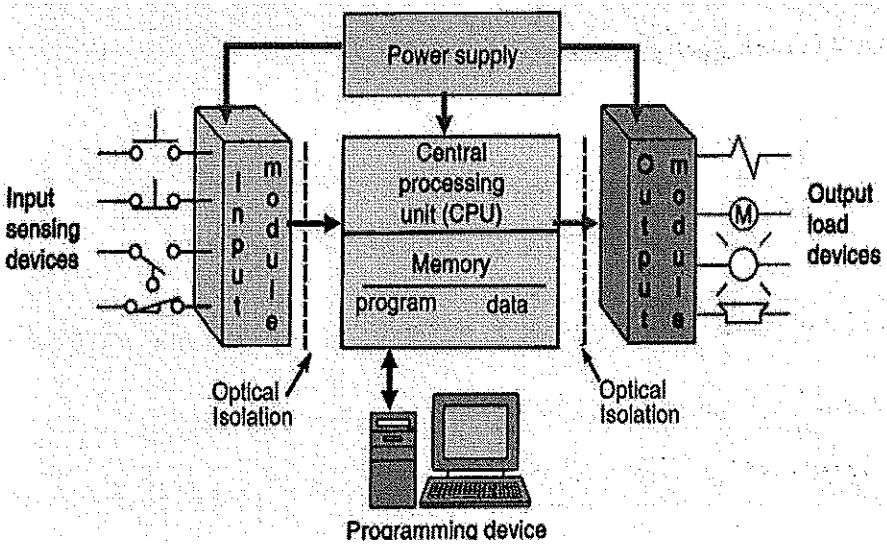
Ans 3. Automation is the technology by which a process or procedure is performed with minimal human assistance. Automation or automatic control is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, aircraft and other applications and vehicles with minimal or reduced human intervention.

In the simplest type of an automatic control loop, a controller compares a measured value of a process with a desired set value, and process the resulting error signal to change some input to the process, in such a way that the process stays at its set point without disturbances.

Introduction of PLC: The programmable logic controller is an industrial computer that monitors input, make decisions based on its program and control the output to automate a process or machine.

The automation of many different process, such as controlling machines or factory assembly lines, is done through the use of small computers called a programmable logic controller (PLCs). Manufacturer: ALLEN-BRADLEY, FUJI ELECTRIC, L&T, SIEMENS, MISTUBISHI, GENIUS, DELTA etc.

Architecture of PLC



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Registration No.: .....

School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

1st In-Sem. Examination (Lateral Entry)

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. Voltage 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. In SI system, the unit of temperature, is

   (a) Kelvin
   (b) Degree Celsius
   (c) Degree Centigrade
   (d) Degree Fahrenheit

5. Basically a potentiometer is a device for
   (a) Comparing two voltage (b) Measuring a current
   (c) Measuring a voltage (d) Comparing two frequency

Section – B

03X02 = 06 Marks

1. What is the difference between analog meter and digital meter?
2. Define Electrical Measurement System.
3. Write down the three types of measuring instruments.

Section – C

03X03 = 09 Marks

1. What is the need of calibration of instrumentation?
2. Draw the block diagram of Electrical Measuring System.
3. Write down the name of metric units.

Answer Key Set – A

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. B
2. B
3. B
4. A
5. A

Section – B

03X02 = 06 Marks

1. What is the difference between analog meter and digital meter

Digital Instrument

The digital instrument gives the output in the numeric form. The instrument is more accurate as compared to the analogue instrument because no human error occurs in the reading.

Analog instrument

The instrument whose output varies continuously is known as the analogue instrument. The analogue instrument has the pointer which shows the magnitude of the measurable quantities.

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 three types 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 Set – A

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.

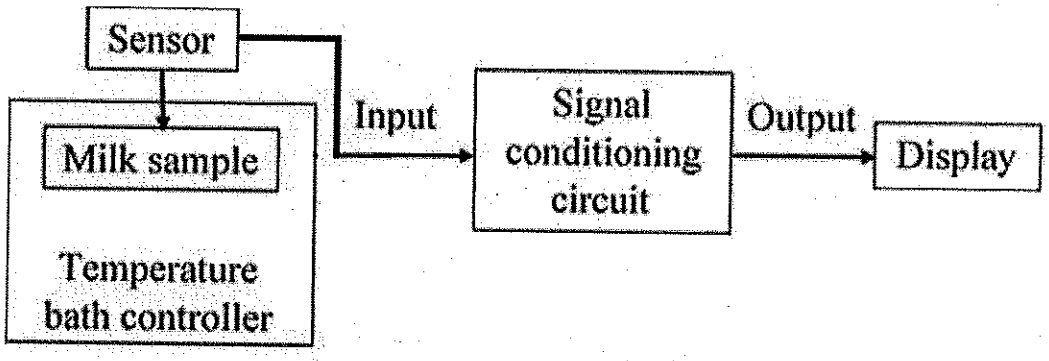
Section – C

03X03 = 09 Marks

1. What is the need of calibration of instrumentations

   The accuracy of all measuring devices degrade over time. This is typically caused by normal wear and tear. However, changes in accuracy can also be caused by electric or mechanical shock or a hazardous manufacturing environment (e.x., oils, metal chips etc.). Depending on the type of instrument and the environment in which it is being used, it may degrade very quickly or over a long period of time. The bottom line is that calibration improves the accuracy of the measuring device. Accurate measuring devices improve product quality.

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.

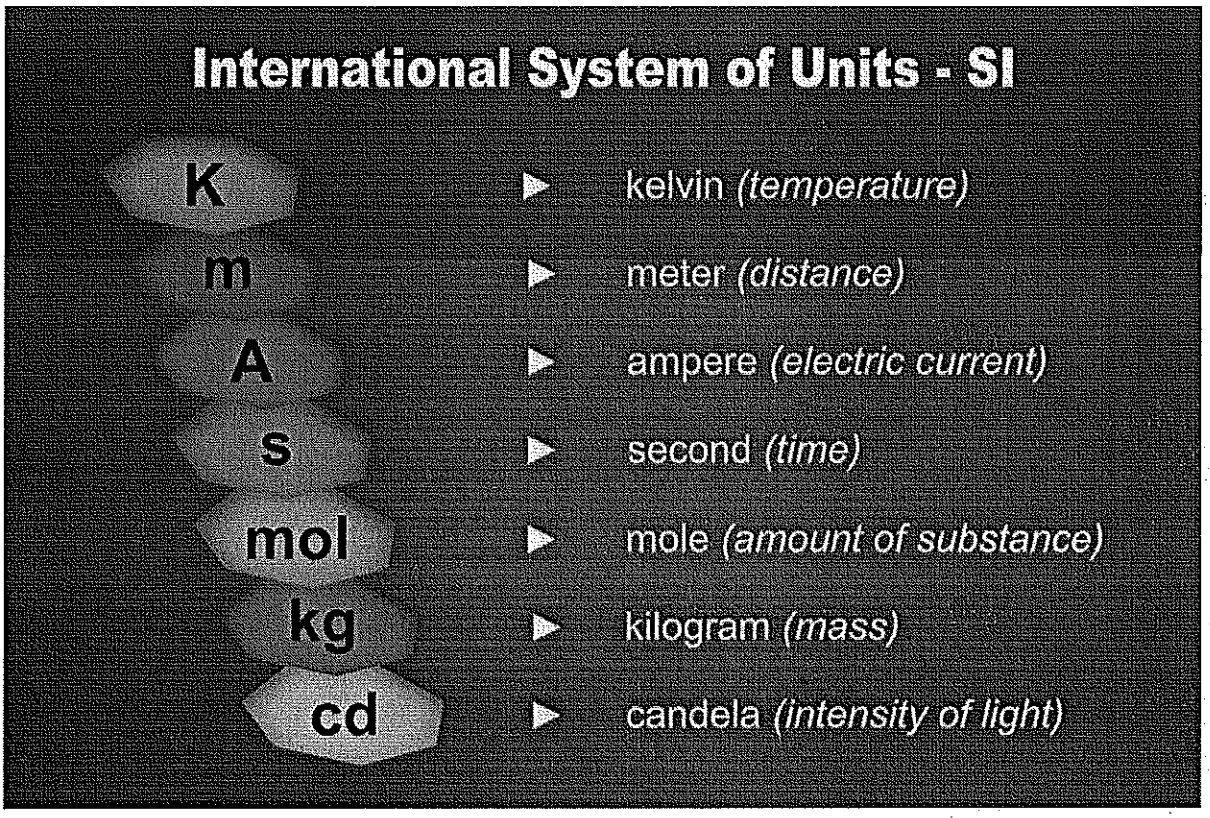
Answer Key Set – A

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*

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Registration No.: .....

School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program,3rd Semester,

1st In-Sem. Examination (Lateral Entry)

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. Coal is a type of :
   (a) Conventional Source of Energy
   (b) Non- Conventional Source of Energy
   (c) 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. "Generator 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 between 345KV- 765KV than it is known as
   (a) High voltage
   (b) Extra High Voltage
   (c) Ultra High Voltage
   (d) Medium Voltage

5. To convert water into steam 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 Generating Substation.
2. Draw a neat and clean Single line diagram of Power System
3. Explain the working of following components
   (a) Boiler (b) Condenser

Section – C

03X03 = 09 Marks

1. Draw a neat and clean layout of Hydro power plant with each component clearly mentioned on it.
2. Define conventional and Non Conventional Sources of Energy? Explain with Example.
3. What do you understand by Power System and What are its main components

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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. Coal is a type of :

Answer- (a) Conventional Source of Energy

2. The heart of Power System is :

Answer- (a) Generator

3. "Generator is a component which is used to change the voltage level without changing frequency". True or False

Answer-(b) False

4. When voltage level is between 345KV- 765KV than it is known as

Answer-(b) Extra High Voltage

5. To convert water into steam which component is used in Thermal Power Plant

Answer- (a) Boiler

Section – B

03X02 = 06 Marks

1. Define Generating Substation.

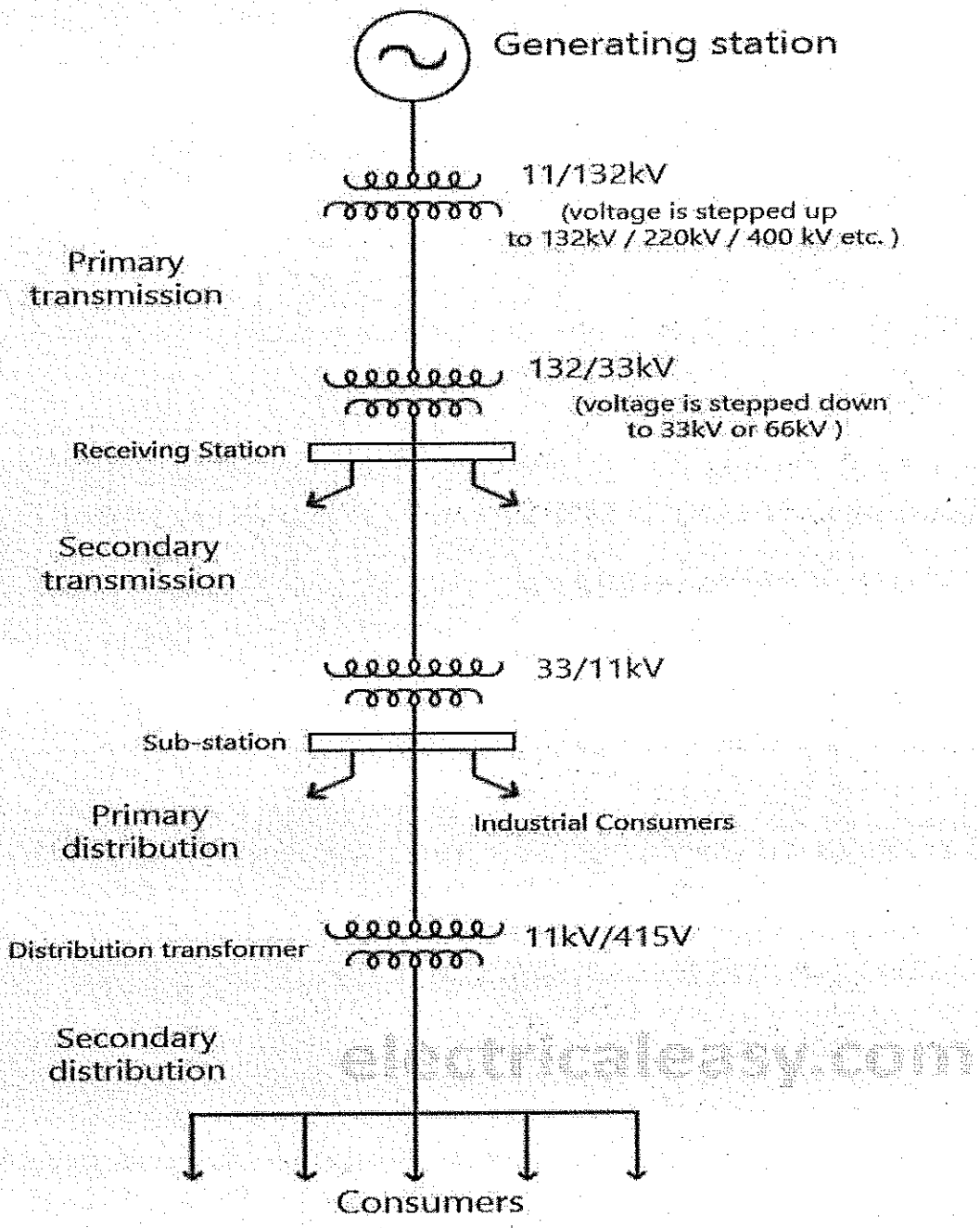
Answer- In generating station the fuel (coal, water, nuclear energy, etc.) is converted into electrical energy. The electrical power is generated in the range of 11kV to 25kV, which is step-up for long distance transmission.

The generator and the transformer are the main components of the generating station.

The generator converts the mechanical energy into electrical energy.

The transformer transfers the power with very high efficiency from one level to another. The power transfer from the secondary is approximately equal to the primary except for losses in the transformer. The step-up transformer will reduce losses in the line which makes the transmission of power over long distances.

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



3. Explain the working of following components

(a) Boiler **(b) Condenser**

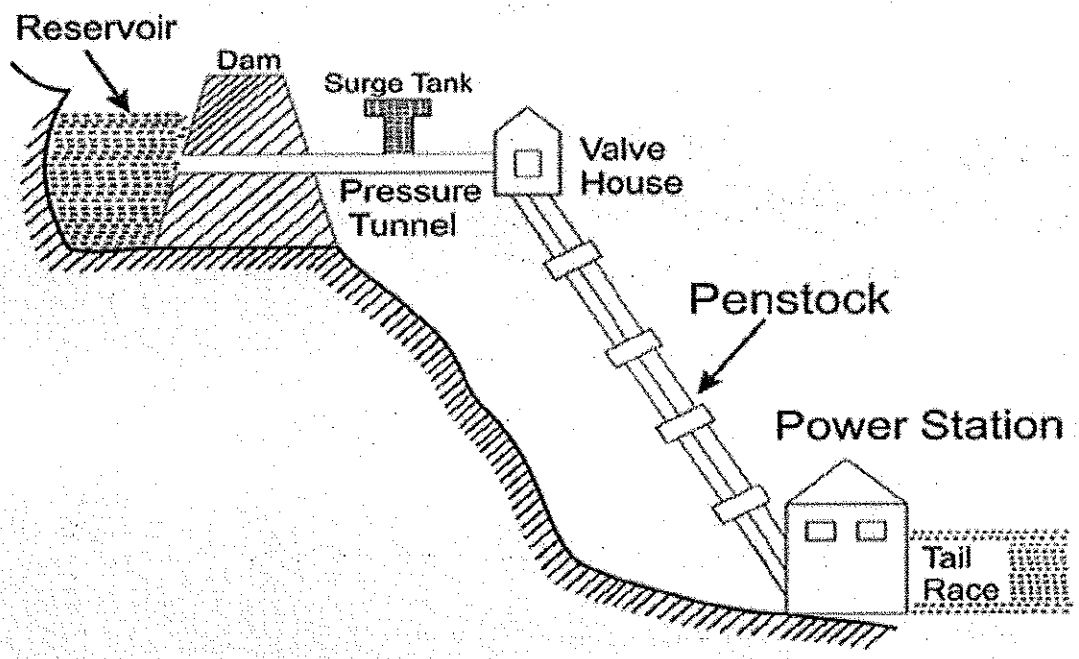
Answer- **(a) Boiler** The function of boiler is to generate steam at desired pressure and temperature by transferring heat produced by burning of fuel in a furnace to change water into steam.

Condenser- The surface condenser is a shell and tube heat exchanger where cooling water flows through tubes and exhaust steam fed into the shell surrounds the tubes. as a result, steam condense outside the tubes

Section – C

03X03 = 09 Marks

1. Draw a neat and clean layout of Hydro 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. **What do you understand by Power System and What are its main components**

Answer- The power system is a network which consists generation, distribution and transmission system. It uses the form of energy (like coal and diesel) and converts it into electrical energy. The power system includes the devices connected to the system like the synchronous generator, motor, transformer, circuit breaker, conductor, etc.

Various Components of Power System are

- Power plant
- Transformer
- Transmission line
- Substations
- Distribution line
- Distribution transformer

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Session: 2021-22 (Summer Semester)

B. Voc. ELE Program, III Semester,

1st In-Sem. Examination (Lateral Entry)

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. 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

2. Generator 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

3. Mechanical Losses are
   a) Core losses b) Friction & Windage losses
   c) Both A&B d) None of these

4. Efficiency means
   a) Output Power /Input power b)Input Power/Output Power
   c) Both A&B d) None of these

5. Coil resistance of the DC series motor is
   (a) High (b) Low (c) Average (d) None of these

Section – B

03X02 = 06 Marks

1. Define electric machines and also write the names of the different types of machines.
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=8?

Section – C

03X03 = 09 Marks

1. Draw and explain the schematic diagram indicating flow of energy in the conservation of mechanical energy to electric form.
2. Write the application of DC and AC motors.
3. Explain the DC shunt motor with the circuit diagram of it.

Answers Key

Course Code: ELE 1306, Course Name: Electrical Machines-I
School of Electrical Skills, Session: 2021-22 (Summer Semester)
B. Voc. Program, 3rd Semester, 1st In-Sem. Examination (Lateral Entry)

Section – A

05X01 = 05 Marks

1. What is the coupling field used between the electrical and mechanical systems in energy conversion devices? c) Magnetic field or Electric field
2. Generator is a machine which converts a) Mechanical Energy into Electrical Energy
3. Mechanical Losses are b) Friction & Windage losses
4. Efficiency means b)Input Power/Output Power
5. Coil resistance of the DC series motor is (b) Low

Section – B

03X02 = 06 Marks

1. Define Electrical Machines and also write the names of different types of electrical machines.
   The machines which are operated in relation with electrical energy are called **electric machines** or **electrical machines**. In **electrical machines**, either input or output or both can be electricity.

The electric machines are of three main types, transformer, generator, and motor

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=8?
   Ans: N= 120f/P

Section – C

03X03 = 09 Marks

1. Draw and explain the schematic diagram indicating flow of energy in the conservation of mechanical energy to electric form.

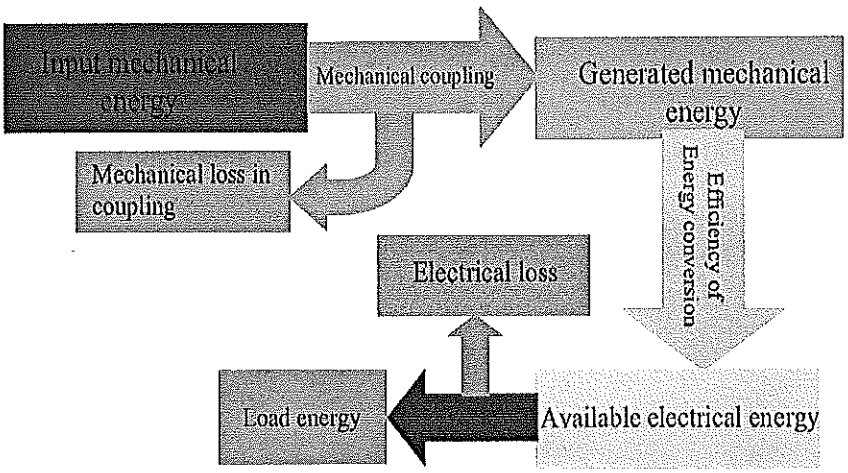
   Electromechanical energy conversion is a conversion of mechanical energy into electrical energy (generator) or vice-versa (motor) with the aid of rotary motion (rotary machines) or translatory (linear) motion (linear machines and actuators)

   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: ELE 1306, Course Name: Electrical Machines-I
School of Electrical Skills, Session: 2021-22 (Summer Semester)
B. Voc. Program, 3rd Semester, 1st In-Sem. Examination (Lateral Entry)

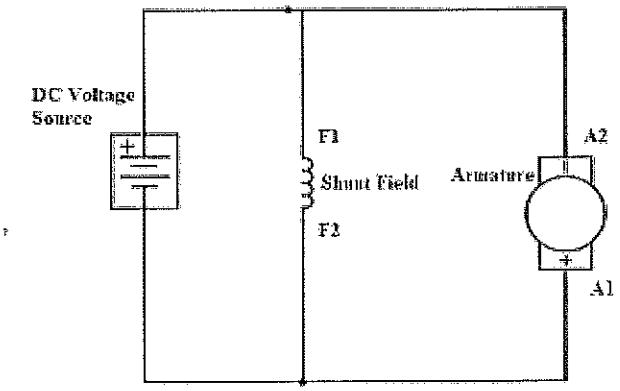


2. Write the application of DC and AC motors.

   Ans: AC motors, with their continuous energy changes, are ideal for industrial and residential applications. AC motors are preferred for compressor power drives, air conditioning compressors, and hydraulic, and irrigation pumps. DC motors are **preferred for steel mill rolling equipment, and paper machines**.

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

Ans: A DC shunt motor (also known as a shunt wound DC motor) is **a type of self-excited DC motor where the field windings are shunted to or are connected in parallel to the armature winding of the motor**. Since they are connected in parallel, the armature and field windings are exposed to the same supply voltage.



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School of Electrical Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

1st In-Sem. Examination (Lateral Entry)

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

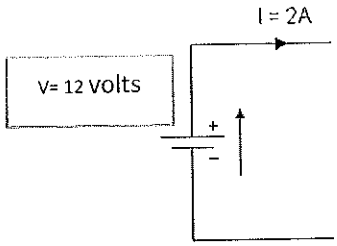
Course Name: Electric Circuit & Drawing **Max. Marks: 20**

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 12 volt voltage source _____



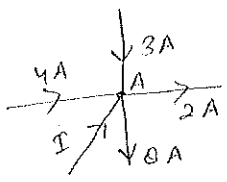
(a) -48W (b) 24W (c) 48W (d) None of these

2. KCL works on the principle of:
   (a) Charge conservation (b) Energy conservation
   (c) Power conservation (d) None of these
3. Unit of Energy is:
   (a) Kwh (b) Joules (c) Watt-Second (d) All of these
4. Absorbed power + Delivered power of an element is:
   (a) Not equal to zero (b) Absorbed power
   (c) Zero (d) None of these
5. Is it advisable to connect different value of voltage sources in a parallel circuit without resistance in between them?
   (a) Maybe (b) Yes (c) No (d) None of these

Section – B

03X02 = 06 Marks

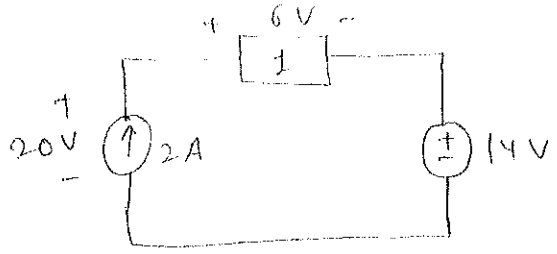
1. State the law of conservation of energy and also define conditions when current will flow in a circuit.
2. State the Ohm's law and draw its graph.
3. Calculate the value of I shown in the given figure.



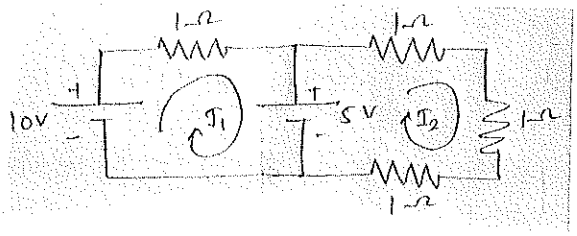
Section – C

03X03 = 09 Marks

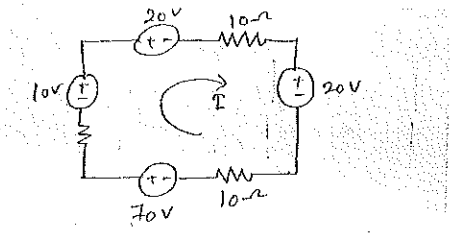
1. Calculate power absorbed by the circuit elements in the given circuit.



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



3. Calculate the current I using KVL from the figure.



Answer Key

Course Code: ELE1307, Course Name: Electric Circuit & Drawing

School of Electrical Skills, 3rd Semester, 1st In-Sem. Examination (Lateral Entry)

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

Section - A

A.1 b

A.2 a

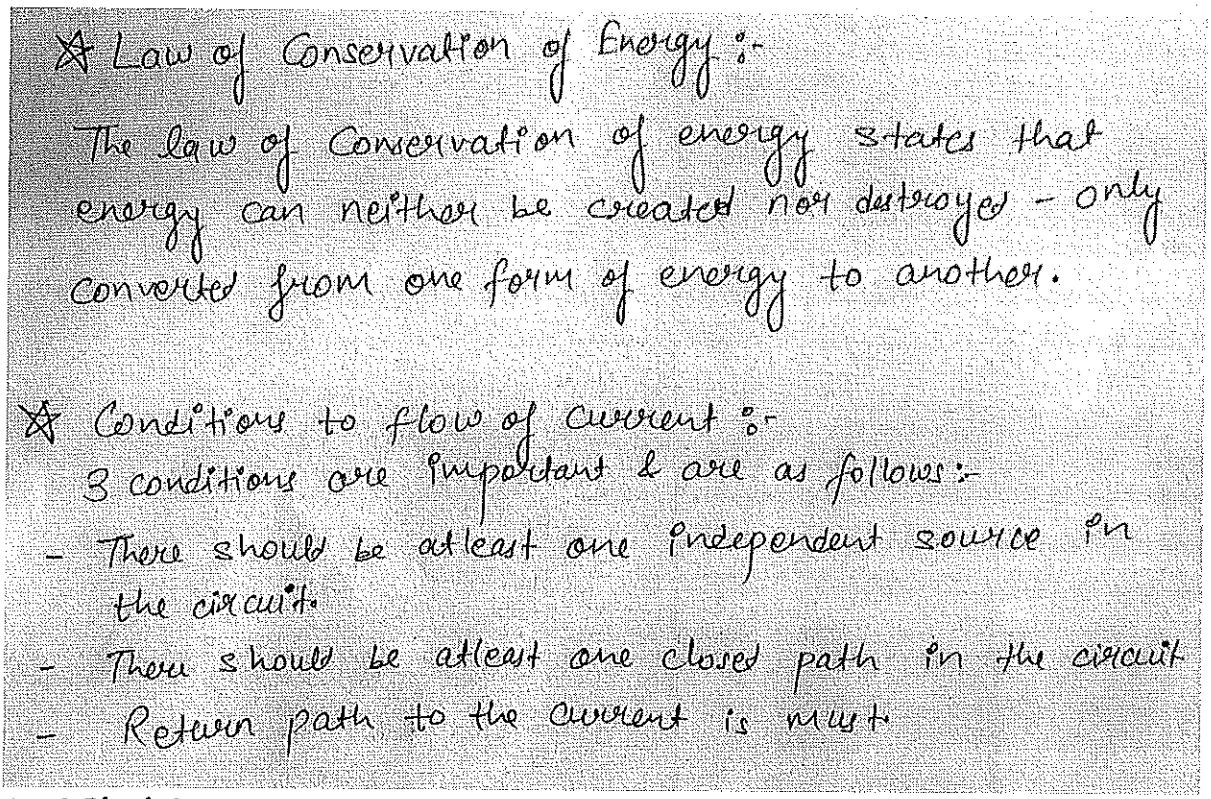
A.3 d

A.4 c

A.5 c

Section-B

Ans.1



Ans.2 Ohm's Law:

Wherever a voltage source is applied across a conductor, current will start flowing through it because of potential difference from higher potential to lower potential.

Ohm's Law states that the current flowing through a conductor is directly proportional to the potential difference (voltage) applied across its ends, provided that temperature and other physical conditions remain unchanged.

Answer Key

Course Code: ELE1307, Course Name: Electric Circuit & Drawing

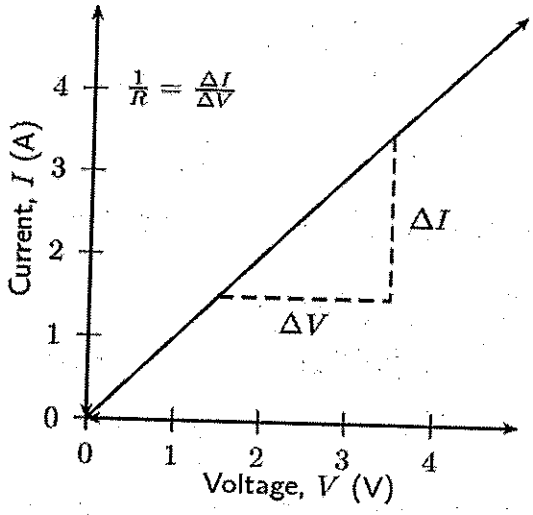
School of Electrical Skills, 3rd Semester, 1st In-Sem. Examination (Lateral Entry)

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

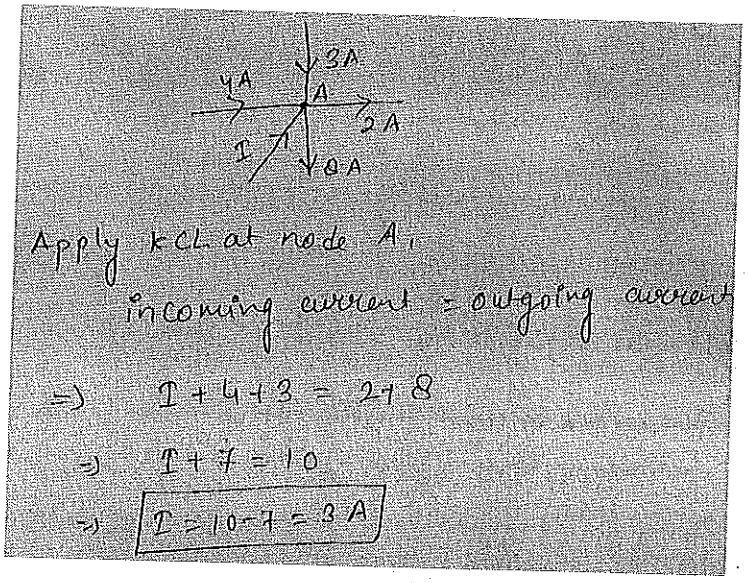
$$V = I*R$$

Where R= proportionality constant, known as Resistance

- Ohm's law is not applicable for unilateral electrical elements like diodes and transistors as they allow the current to flow through in one direction only.
- For non- linear elements also, ohm's law is not applicable.



Ans.3



Answer Key

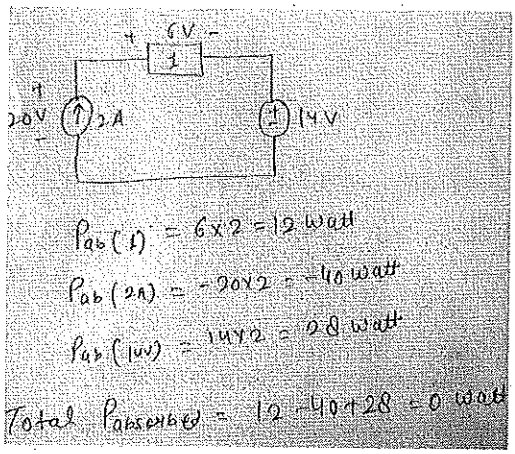
Course Code: ELE1307, Course Name: Electric Circuit & Drawing

School of Electrical Skills, 3rd Semester, 1st In-Sem. Examination (Lateral Entry)

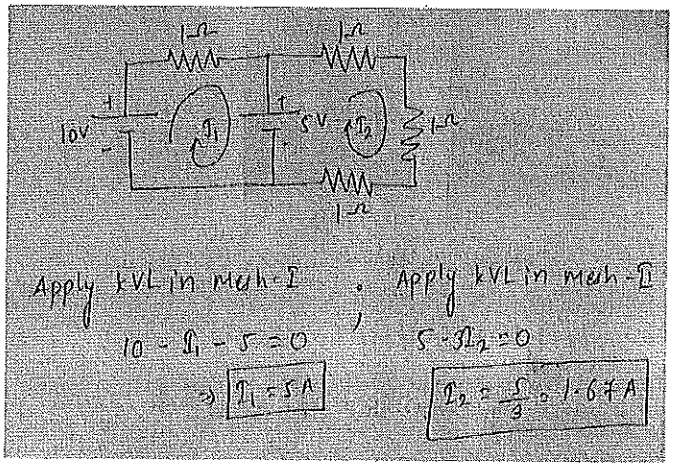
B. Voc. Program, Summer Semester (2021-22)

Section-C

Ans.1



Ans.2



Ans.3