BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
1st In-Sem. Examination

Course Code: ELE 1101 **Time: 1 Hour**
Course Name: Construction Electrician **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

Q1. Two – way switch wiring is recommended for:
(a) Bedroom (b) Kitchen
(c) Hall and staircases (d) Bathroom

Q2. What is the current carrying capacity of 2.5 sq. mm copper wire?
(a) 9 A (b) 18 A (c) 25 A (d) 12 A

Q3. BIS stands for:
(a) Bureau of International Standard (b) Bureau of Indian Standard
(c) British Information Standard (d) None of these

Q4. Ceiling rose is mainly used to:
(a) Control ceiling fan (b) Make junction of electrical connection
(c) Control light and fan circuit (d) Make junction of all appliances

Q5. Which colour combination is recommended for single phase AC supply in India?
(a) Red, Blue, Green (b) Red, Yellow, Blue
(c) Red, Black, Green (d) Brown, Black, White

Section – B

03X02 = 06 Marks

Q1. What do you understand by standard wire gauge? Make conversion table from SWG to diameter and cross sectional area of wire.
Q2. Explain the meaning of push button with symbol.
Q3. What are the advantages and disadvantages of PVC conduit house wiring?

Section – C

03X03 = 09 Marks

Q1. Describe SPST, SPDT and DPST switches with symbol and circuit diagram.
Q2. Write the recommendations of the NEC for mounting the accessories.
Q3. What are plug and socket? Explain any six types of plugs and sockets.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Answer Key (ELE 1101)

School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, First Semester,
1st In-Sem. Examination

Course Code: ELE 1101
Course Name: Construction Electrician **Max. Marks: 20**

Section – A

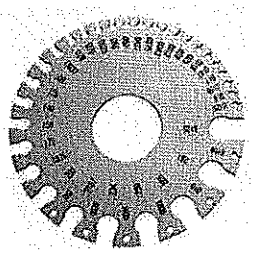
05X01 = 05 Marks

Ans. 1. (c) Hall and staircases
Ans. 2. (b) 18 A
Ans. 3. (b) Bureau of Indian Standard
Ans. 4. (b) Make junction of electrical connection
Ans. 5. (c) Red, Black, Green

Section – B

03X02 = 06 Marks

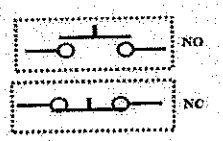
Ans. 1. S.W.G. (Standard Wire Gauge): A Instrument which is used for measuring the diameter (gauge) or Cross Area of wire.



SWG	Diameter (mm)	Cross-Sectional Area (mm^2)
1	7.620	45.6037
2	7.010	38.5989
3	6.401	32.1780
4	5.893	27.2730
5	5.385	22.7735
6	4.877	18.6793
7	4.470	15.6958
8	4.064	12.9717
9	3.658	10.5071
10	3.251	8.3019

Ans. 2. Push Button Switch: It is a momentary contact switch that makes or breaks connection as long as pressure is applied (or when the button is pushed).

- Generally, this pressure is supplied by a button pressed by someone's finger.
- This button returns its normal position, once the pressure is removed.
- The internal spring mechanism operates these two states (pressed and released) of a push button.
- It consists of stationary and movable contacts, of which stationary contacts are connected in series with the circuit to be switched while movable contacts are attached with a push button.
- Push buttons are majorly classified into normally open, normally closed and double acting push buttons as shown in the above figure.



Ans. 3. Conduit: An electrical conduit is a tube used to protect and route electrical wiring in a building or structure. Electrical conduit may be made of metal, plastic, fiber, or fired clay. Most conduit is rigid, but flexible conduit is used for some purposes.

Advantages:
Allows adding new wiring to an existing building without removing or cutting holes into the drywall, lath and plaster, concrete, or other wall finish.
Allows circuits to be easily locatable and accessible for future changes, thus enabling minimum effort upgrades.

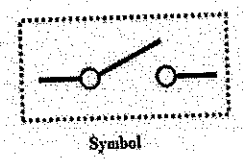
Disadvantages:
Appearance may not be acceptable to all observers.

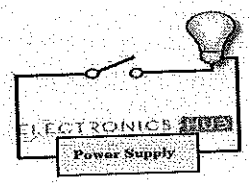
Section – C

03X03 = 09 Marks

Ans. 1. Single Pole Single Throw Switch (SPST): This is the basic ON and OFF switch consisting of one input contact and one output contact.

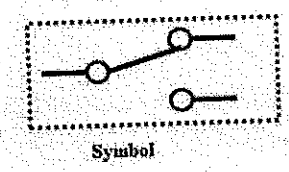
- It switches a single circuit and it can either make (ON) or break (OFF) the load.
- The contacts of SPST can be either normally open or normally closed configurations.

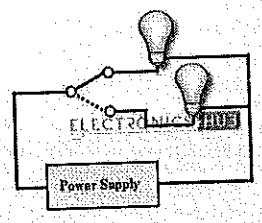




Single Pole Double Throw Switch (SPDT): This switch has three terminals, one is input contact and remaining two are output contacts.

- This means it consists one ON position and one OFF position at a time.
- In most of the circuits, these switches are used as changeover to connect the input between two choices of outputs.
- The contact which is connected to the input by default is referred as normally closed contact and contact which will be connected during ON operation is a normally open contact.

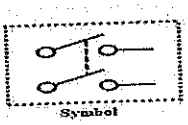


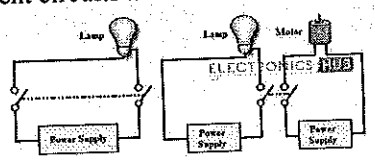


SPDT Switch Circuit

Double Pole Single Throw Switch (DPST): This switch consists of four terminals, two input contacts and two output contacts.

- It behaves like a two separate SPST configurations, operating at the same time.
- It has only one ON position, but it can actuate the two contacts simultaneously, such that each input contact will be connected to its corresponding output contact.
- In OFF position both switches are at open state.
- This type of switches is used for controlling two different circuits at a time.





Ans. 2. Recommendations of the NEC for mounting the accessories:

- All ceiling roses, brackets, pendants and accessories shall be mounted on substantial wooden blocks, having a depth not less than 4 cm.
- Where teak or hardwood boards are used for mounting switches regulators etc. these boards shall be well varnished with pure shellac on all sides (both inside and outside) irrespective of being painted to match the surroundings. The size of such boards shall depend on the number of accessories that could conveniently and neatly be arranged.
- No mounting of accessories shall be done within 2.5 cm of any edge of the panel of the board and no hole other than the holes by means of which the panel is fixed shall be drilled closer than 1.3 cm from any edge of the panel.
- A switchboard shall not be installed unless its bottom is 1.25 m above the floor except when the switchboard is enclosed in a box with locking arrangement.
- If the switchboards are recessed in the wall, the front shall be fitted with a hinged panel of teakwood or other suitable material, such as Bakelite, or with an unbreakable glass door in teak wood frame.
- Open type switchboards shall not be placed in the vicinity of storage batteries or exposed to chemical fumes.
- Switchboards shall not be erected above gas stoves or sinks, or within 2.5 m of any washing unit in the washing room.
- Unnecessary crossing of connections should be avoided between the apparatus and terminals, within the board.
- In a hinged type board, the incoming and outgoing cables shall be fixed at one or more points according to the number of cables on the back of the board leaving suitable space in between the cables.

Ans. 3. Plug and socket: AC power plugs and sockets connect electric equipment to the alternating current power supply in buildings and at other sites. Electrical plugs and sockets differ from one another in voltage and current rating, shape, size, and connector type. Different standard systems of plugs and sockets are used around the world.

Type A

- It is mainly used in the USA, Canada, Mexico & Japan.
- 2 pins
- not grounded
- 15 A
- almost always 100 – 127 V
- socket compatible with plug type A

Type B

- It is mainly used in the USA, Canada, Mexico & Japan.
- 3 pins
- grounded
- 15 A
- almost always 100 – 127 V
- socket compatible with plug types A & B

Type C

- It is commonly used in Europe, South America & Asia.
- 2 pins
- not grounded
- 2.5 A
- almost always 220 – 240 V
- socket compatible with plug type C

Type D
- It is mainly used in India.
- 3 pins
- grounded
- 5 A
- 220 – 240 V
- socket compatible with plug type D (partial and unsafe compatibility with C, E & F)

Type E
- It is primarily used in France, Belgium, Poland, Slovakia & Czechia.
- 2 pins
- grounded
- 16 A
- 220 – 240 V
- socket compatible with plug types C, E & F

Type F
- It is used almost everywhere in Europe & Russia, except for the UK & Ireland.
- 2 pins
- grounded
- 16 A
- 220 – 240 V
- socket compatible with plug types C, E & F

Type G
- It is mainly used in the United Kingdom, Ireland, Malta, Malaysia & Singapore.
- 3 pins
- grounded
- 13 A
- 220 – 240 V
- socket compatible with plug type G

Type H
- It is used exclusively in Israel, the West Bank & the Gaza Strip.
- 3 pins
- grounded
- 16 A
- 220 – 240 V
- socket compatible with plug types C & H
  (unsafe compatibility with E & F)

Type I
- It is mainly used in Australia, New Zealand, China & Argentina.
- 2 or 3 pins
- 2 pins: not grounded / 3 pins: grounded
- 10 A
- 220 – 240 V
- socket compatible with plug type I

Type J
- It is used almost exclusively in Switzerland & Liechtenstein.
- 3 pins
- grounded
- 10 A
- 220 – 240 V
- socket compatible with plug types C & J

Type K
- It is used almost exclusively in Denmark & Greenland.
- 3 pins
- grounded
- 16 A
- 220 – 240 V
- socket compatible with plug types C & K
  (unsafe compatibility with E & F)

Type L

- It is used almost exclusively in Italy & Chile.
- 3 pins
- grounded
- 10 A & 16 A
- 220 – 240 V
- 10 A socket compatible with plug types C & L (10 A version) / 16 A socket compatible with plug type L (16 A version)

Type M

- It is mainly used in South Africa.
- 3 pins
- grounded
- 15 A
- 220 – 240 V
- socket compatible with plug type M

Type N

- It is used in Brazil and South Africa.
- 3 pins
- grounded
- 10 A & 20 A
- 100 – 240 V
- socket compatible with plug types C & N

Type O

- It is used exclusively in Thailand.
- 3 pins
- grounded
- 16 A
- 220 – 240 V
- socket compatible with plug types C & O (unsafe compatibility with E & F)

Registration No.: .....

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School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
1st In-Sem. Examination

Course Code: ELE 1102 **Time: 1 Hour**
Course Name: Electrical 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 calculator is allowed.

Section – A

05X01 = 05 Marks

Q.1. Electrical drawings are also called:
(a) Simple drawing (b) Electrical Circuit diagram
(c) Venn diagram (d) None of these

Q.2. The following is not included in the title block of drawing sheet:
(a) Sheet Number (b) Scale (c) Method of projection (d) Size of sheet

Q.3. The following line is used for dimension line:
(a) Continuous thick (b) Continuous thin (c) Both of these (d) None of these

Q.4. The dotted lines represent:
(a) Hidden edges (b) Projection Line (c) Both of these (d) None of these

Q.5. The fraction of milli is:
(a) 10^{-2} (b) 10^{-3} (c) 10^{-6} (d) 10^{-9}.

Section – B

03X02 = 06 Marks

Q.1. What is electrical plan drawing? Describe.
Q.2. What are the purpose of ground and variable power source? Illustrate with their electrical symbols.
Q.3. Why married joints are used in cables? Explain with diagram.

Section – C

03X03 = 09 Marks

Q.1. What is the difference between isometric and orthographic projections in electrical drawing?
Q.2. What are the different types of switches used in electrical drawing? Explain each with neat sketch.
Q.3. Why dimensioning is required electrical drawing sheets? Explain.

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School of Electrical Skills
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Course Code: ELE 1102 **Time: 1 Hour**
Course Name: Electrical Drawing **Max. Marks: 20**

Section – A

05X01 = 05 Marks

Ans. 1. (b) Circuit diagram
Ans. 2. (d) Size of sheet
Ans. 3. (b) Continuous thin
Ans. 4. (a) Hidden edges
Ans. 4. (b) 10^{-3}

Section – B

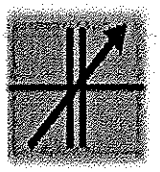
03X02 = 06 Marks

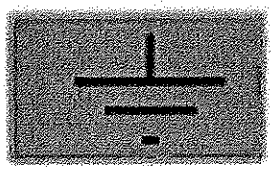
1. What is electrical plan drawing? Describe.
Ans.: Electrical drawings, sometimes referred to as wiring diagrams, are a type of technical drawing that provide visual representation describing electrical systems or circuits. They are used to explain the design to electricians or other workers who will use them to help install or repair electrical systems.

2. What are the purpose of ground and variable power source? Illustrate with their electrical symbols?
Ans.

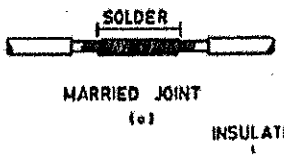
Ground or earth can refer to the reference point in an electrical circuit from which voltages are measure. A common return path for electric current or a direct physical connection to the Earth.

(2). Variable power source: An AC power supply typically takes the voltage from mains supply and lowers it to the desired voltage





3. Why married joints are used in cables? Explain with diagram.
Ans. The married joint is an electrical joint used for joining multi-strand cables. The wires are unstranded, then interlaced with the wires of the other cable, and then married (twisted) together before finally being soldered.



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Section – C

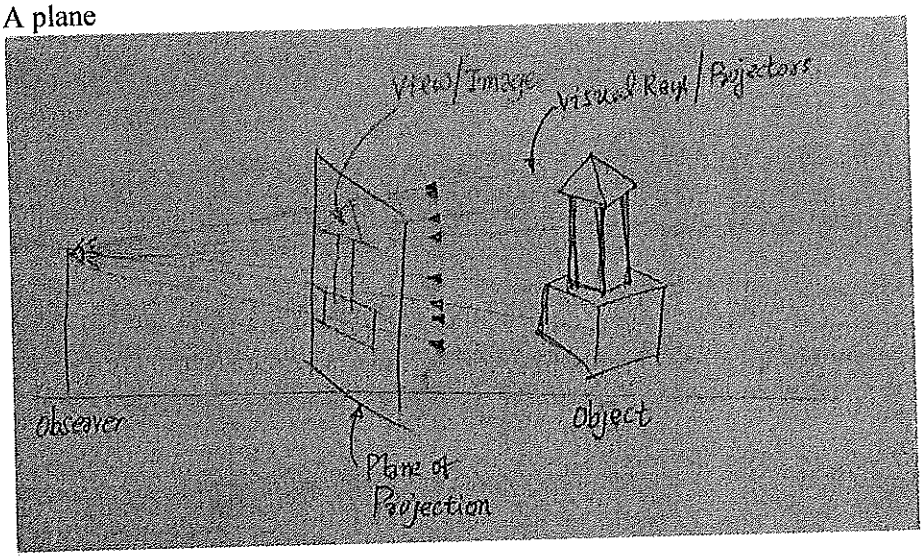
03X03 = 09 Marks

1. **What is the difference between isometric and orthographic projections in electrical drawing?**

Ans. The orthographic/parallel enables to create single/multiple views of the object in question. So sometimes it's also called multi-view drawing. This gives you true shapes & true dimensions of the object.

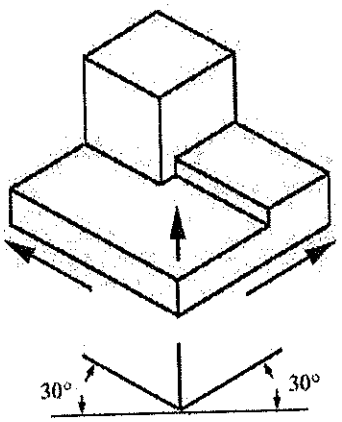
Orthographic:
To understand this consider the following

- An observer
- An object
- A plane



Isometric: Isometric Drawing

The representation of the object in figure 2 is called an isometric drawing. This is one of a family of three-dimensional views called pictorial drawings. In an isometric drawing, the object's vertical lines are drawn vertically, and the horizontal lines in the width and depth planes are shown at 30 degrees to the horizontal. When drawn under these guidelines, the lines parallel to these three axes are at their true (scale) lengths. Lines that are not parallel to these axes will not be of their true length.



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2. What are the different types of switches used in electrical drawing? Explain each with neat sketch.

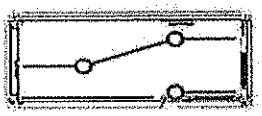
Ans.

1. **Push switch:** A push switch allows current to flow only when the button is pressed like switch in door bell.

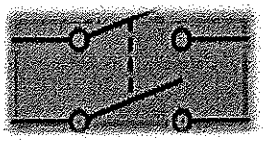
2. **Push to break switch:** This type of switch is normally closed i.e. on. It is open only when button is pressed.

3. **SPST:** Single Pole, single Throw: An on—off switch allows current to flow only when it is closed.

4. **SPDT:** Single Pole, Double Throw: They are described as on off on switch.



DPST: Double Pole, single Throw: A dual on off switch often used to switch main electricity.



6. **DPDT:** Double Pole, Double Throw: They are used in motors.

3. Why dimensioning is required electrical drawing sheets. Explain.

Ans. Drawing dimensions are added to a drawing to further document the model, without changing or controlling features or part size. You add drawing dimensions as annotations to drawing views or geometry in drawing sketches. Drawing dimensions are expressed as numeric constants.

(i) **Dimension lines in a drawing should be placed as far as possible outside the outline of a view.**
(ii) **All dimensions should be placed above their respective dimension lines, and normal to the lines, such that these can be easily read from the bottom or right hand side of the drawing sheet.**
(iii) **Dimension lines should not cut each other. Smaller dimensions should be placed first, that is, the dimensions should be marked in the ascending order.**

(iv) **Dimension lines are never shown dotted.**
(v) **Dimensions must only be given once and not be repeated on other views.**
(vi) **Holes are dimensioned by stating their diameters.**
There are usually three representations as follows:

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School of Electrical Skills
Session: 2019-20 (Summer Semester)
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Course Code: ELE 1103 **Time: 1 Hour**
Course Name: Basic Electrical Engineering **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

Q.1. Henry is the Unit of:
(a) Inductance (b) Capacitance (c) Resistance (d) Power

Q.2. Which relation defines Ohm's law from the following provided load is constant?
(a) Current is α voltage (b) Voltage α Current
(c) Both a and b (d) None of these

Q.3. The sum of the incoming currents at a junction is equal to sum of the _____.
(a) Incoming currents (b) Outgoing currents
(c) Incoming voltage (d) Outgoing voltage

Q.4. A wire has resistance of 12 Ω. It is bent in the form of a circle then the resistance of the circle is at both the ends of diameter will be:
(a) 12 Ω (b) 24 Ω (c) 0 Ω (d) 3 Ω

Q.5. What is the unit for specific resistivity?
(a) Ohm cm^2 (b) Ohm cm^{-1} (c) Ohm cm (d) Ohm cm^{-2}

Section – B

03X02 = 06 Marks

Q.1. What is the difference between conductors and insulators?
Q.2. If six cells of 2V are connected in parallel to make a battery, then what will happen to the capacity of voltage & current of the battery?
Q.3. Why are the birds not getting a shock when they are sitting on the live phase wire of 11 kV power supply line?

Section – C

03X03 = 09 Marks

Q.1. If the distance between two equal point charges is doubled and their individual charges also doubled. What would happen to the force between them?
Q.2. The equivalent capacitance of three capacitors having the values of 2 μf, 4 μf and C3 is equivalent to 1.5 μf. Please make the circuit of the combination of these capacitances and calculate the capacitance of the capacitor C3.
Q.3. A series circuit consists of three resistors valued at 20 Ω, 40 Ω, and 60 Ω respectively. If the current of the circuit is 2 amperes, what is the source voltage?

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Course Name: Basic Electrical Engineering **Max. Marks: 20**

Section – A

05X01 = 05 Marks

Q.1. Henry is the Unit of:
(a) Inductance (b) Capacitance (c) Resistance (d) Power

Ans. (a)

Q.2. Which relation defines Ohm's law from the following provided load is constant?
(a) Current is α voltage (b) Voltage α Current
(c) Both a and b (d) None of these

Ans. (a)

Q.3. The sum of the incoming currents at a junction is equal to sum of the _____.
(a) Incoming currents (b) Outgoing currents
(c) Incoming voltage (d) Outgoing voltage

Ans. (b)

Q.4. A wire has resistance of 12 Ω. It is bent in the form of a circle then the resistance of the circle is at both the ends of diameter will be:
(a) 12 Ω (b) 24 Ω (c) 0 Ω (d) 3 Ω

Ans. (d)

Q.5. What is the unit for specific resistivity?
(a) Ohm cm^2 (b) Ohm cm^{-1} (c) Ohm cm (d) Ohm cm^{-2}

Ans. (c)

Section – B

03X02 = 06 Marks

Q.1. What is the difference between conductors and insulators?

Ans. Conductors: These are the substances which allow large scale physical movement of electrical charge through them when an external electrical field is applied. For example, Silver, Aluminium and copper.

Insulators: These are the substances when do not allowed physical move up of electrical charges when the external field is applied. For example, wood & glass.

Q.2. If six cells of 2V are connected in parallel to make a battery, then what will happen to the capacity of voltage & current of the battery?

Ans. The capacity of voltage battery will be 2 V but current capacity of battery will increase by six times in comparison to a cell.

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Q.3. Why are the birds not getting a shock when they are sitting on the live phase wire of 11 kV power supply line?

Ans. The birds are isolated from the ground and not getting earthed so they will not get shock.

Section – C

03X03 = 09 Marks

Q.1. If the distance between two equal point charges is doubled and their individual charges also doubled. What would happen to the force between them?

Ans. The original force between the total charges is $F = \frac{1}{4\pi \in 0} \times \frac{q_1 x\, q_2}{\gamma^2}$

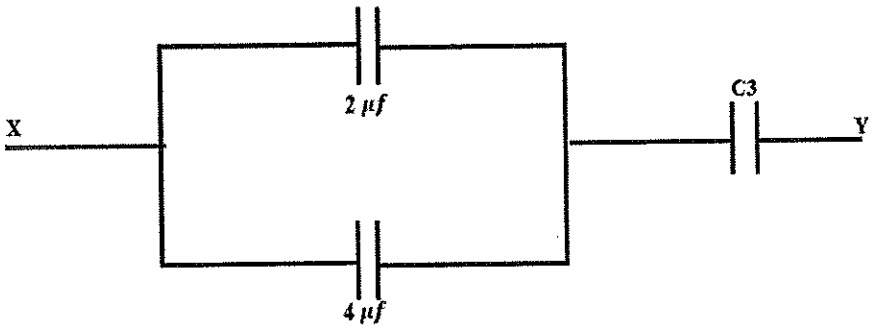
When the individual charges and distance between them doubted the force becomes

$F = \frac{1}{4\pi \in 0} \times \frac{2q_1 x\, 2q_2}{(2\gamma)^2}$

Therefore, the force will remain same between them.

Q.2. The equivalent capacitance of three capacitors having the values of 2 μf, 4 μf and C3 is equivalent to 1.5 μf. Please make the circuit of the combination of these capacitances and calculate the capacitance of the capacitor C3.

Ans.



2 μf and $4\mu f$ are in parallel so they will be added and the value will be $6\mu f$ and this value is in series with C3. So making them parallel the value of C3 will be calculated by considering equivalent value $1.5\mu f$ and the value of C3 will come ¾ μf.

Q.3. A series circuit consists of three resistors valued at 20 Ω, 40 Ω, and 60 Ω respectively. If the current of the circuit is 2 amperes, what is the source voltage?

Ans. The total value of resistance of 3 resistors when they are in series will be = 20 Ω + 40 Ω + 60 Ω = 120 Ω.

We know that V = I x R

The value of I is given = 2 A.

And the value of R is calculated as 120 Ω

Therefore, source voltage will be V = 2 x 120

= 240 V

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills

Session: 2019-20 (Summer / Winter Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: ELE1104 **Time: 1 Hour**

Course Name: Maintenance Technician Electrical **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

Q.1. Digital multimeter is used for:

(a) Measuring a.c and d.c current, voltage and resistance
(b) Measuring a.c current and voltage
(c) Measuring d.c current and resistance
(d) Measuring a.c voltage and resistance

Q.2. Megger is used to measure:

(a) Insulation Resistance (b) Current (c) both a and b (d) None of these

Q.3. The temperature range for soldering process should be:

(a) 40^0C to 100oC (b)180oC to 250oC
(c) 300oC to 500oC (d) 600oC to 900oC

Q.4. The tool required for removing the insulation of cable is:

(a) Combination Plier (b) Knife (c) Cable Stripper (d) all of these

Q.5. Rosin core flux is used in:

(a) Electronics (b) Plumbing (c) Both a & b (d) None of these

Section – B

03x02 = 06 Marks

Q.1. What is the difference among soldering, brazing and welding?
Q.2. Write down the names of 10 electrician hand tools which are used for house wiring.
Q.3. Write down the types of solder wires with their composition.

Section – C

03x03 = 09 Marks

Q.1. Define multi-meter. Draw neat sketch with block diagram of multi meter.
Q.2. Write short note on megger.
Q.3. What is soldering? Explain the soldering procedure with appropriate diagram.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills
Session: 2019-20 (Summer / Winter Semester)
B. Voc. Program, 1st Semester,
1st In-Sem. Examination

Course Code: ELE1104
Course Name: Maintenance Technician Electrical **Max. Marks: 20**

Section – A

05x01 = 05 Marks

Q.1. Digital multimeter is used for:
Ans. (a) Measuring a.c and d.c current, voltage and resistance
Q.2. Megger is used to measure:
Ans. (a) Insulation Resistance
Q.3. The temperature range for soldering process should be:
Ans. (c) 300oC to 500oC
Q.4. The tools required for removing the insulation of cable is:
Ans. (c) Cable Stripper
Q.5. Rosin core flux is used in:
Ans. (a) Electronics

Section – B

03x02 = 06 Marks

Q.1. What is the difference among soldering, brazing and welding?

Ans.

Serial No	Welding	Soldering	Brazing
1	Welding joints are strongest joints used to bear the load. Strength of the welded portion of joint is usually more than the strength of base metal.	Soldering joints are weakest joints out of three. Not meant to bear the load. Use to make electrical contacts generally.	Brazing joints are weaker than welding joints but stronger than soldering joints. This can be used to bear the load up to some extent.
2	Temperature required is 3800°C in welding joints.	Temperature requirement is up to 450°C in soldering joints.	Temperature may go to 600°C in brazing joints.
3	To join work pieces need to be heated till their melting point.	Heating of the work pieces is not required.	Work pieces are heated but below their melting point.
4	Mechanical properties of base metal may change at the joint due to heating and cooling.	No change in mechanical properties after joining.	May change in mechanical properties of joint but it is almost negligible.
5	Heat cost is involved and high skill level is required.	Cost involved and skill requirements are very low.	Cost involved and sill required are in between other two.

Q.2. Write down the names of 10 electrician hand tools which are used for house wiring.

Ans. 1. Combination plier 2. Nose plier 3. Side cutting plier 4. Wire stripper
5. Cable stripper 6. Crimping tool 7. Pipe cutter 8. Step drill bit
9. Mallet 10. Flat file

Q.3. Write down the types of solder wires with their composition.

Ans. Four type
1 Soft solder – 37% lead (Pb), 63% tin (Sn)
2 Medium solder – 50% lead, 50% tin
3 Plumber solder – 70% lead, 30% tin
4 Electrician solder – 58% lead, 42% tin

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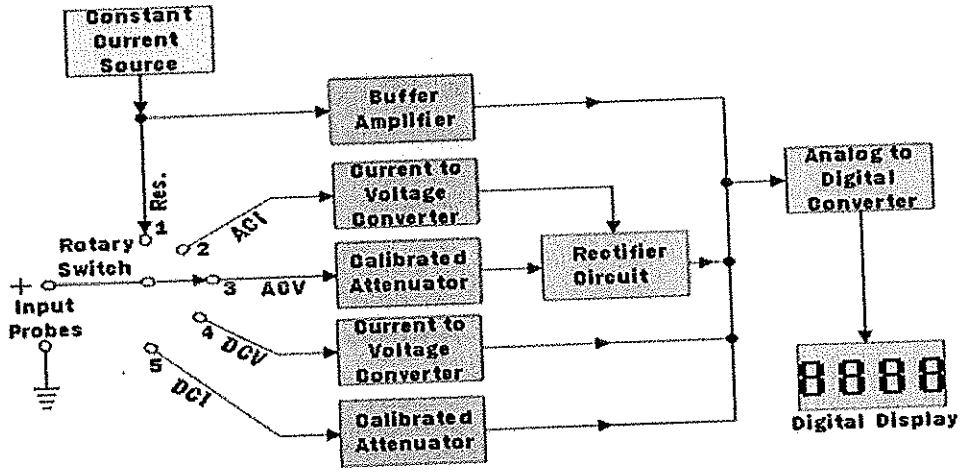
Section – C

03x03 = 09 Marks

Q.1. Define multi-meter. Draw neat sketch with block diagram of multi meter.

Ans. Multimeter: A multimeter is an electronic device used to measure voltage, amps and resistance across circuits. By attaching two leads to different parts of an electrical system, professionals can use multimeter to detect levels of voltage and resistance, or changes in electrical currents.

Block Diagram of Multimeter:



Measurements by Digital Multimeter

Resistance
ACV (Alternating voltage)
ACI (Alternating current)
DCI (Direct current)
DCV (Direct voltage)

- The current is converted into voltage by passing through low shunt resistance
- The A.C quantities converted into D.C quantities by employing various rectifier and filtering circuit
- The resistance measurements consist of a low current source that is a applied across an unknown resistance

Buffer Amplifier: A buffer amplifier (sometimes simply called a buffer) is one that provides electrical impedance transformation from one circuit to another, with the aim of preventing the signal source from being affected by whatever currents (or voltages, for a current buffer) that the load may be produced with. The signal is 'buffered from' load currents.

Current to voltage converter: A current to voltage converter will produce a voltage proportional to the given current. This circuit is required if your measuring instrument is capable only of measuring voltages and you need to measure the current output.

Calibrated Attenuator: An attenuator is an electronic device that reduces the power of a signal without appreciably distorting its waveform.

Constant Current source: A **constant current source** is a power **source** which provides a **constant current** to a load, even despite changes and variance in load resistance.

Rectifier Circuit: **Rectification** is the conversion of alternating current (AC) to direct current (DC).

Analog-to-digital conversion: This an electronic process in which a continuously variable (**analog**) signal is changed, without altering its essential content, into a multi-level (**digital**) signal

Digital Display: A display that gives the information in the form of characters (numbers or letters)

Q.2. Write short note on megger.

Ans. History of Megger

The device is being used since 1889, popularity raised during 1920s since the long back device is same in its uses and purpose of testing, few real improvements appeared in recent years with its design and quality of tester. Now high-quality options are available which are easy to use and quite safe.

What is Megger?

The device enables us to measure electrical leakage in wire, results are very reliable as we shall be passing electric current through device while we are testing. The equipment basically uses for verifying

the electrical insulation level of any device such as motors, cables, generators, windings, etc. This is a very popular test being carried out since very long back. Not necessary it shows us exact area of electrical puncture but shows the amount of leakage current and level of moisture within electrical equipment/winding/system.

Types of Megger

This can be separated into mainly two categories: -

1.Electronic Type (Battery Operated)

2.Manual Type (Hand Operated)

Note: But there is another types of megger which is motor operated type which does not use battery to produce voltage it requires external source to rotate an electrical motor which in turn rotates the generator of the megger.

Electronic Type Megger

Important parts: -

1.Digital Display: - A digital display to show IR value in digital form.

2.Wire Leads: - Two nos of wire leads for connecting megger with electrical external system to be tested.

3.Selection Switches: - Switches use to select electrical parameters ranges.

4.Indicators: - To indicates various parameters status i.e. On-Off. For Example, Power, hold, Warning, etc.

Note: – Above construction is not similar for every megger, it difference appears manufacture to manufacture but basic construction and operation are same for all.

Advantages of Electronic Type Megger

1.Level of accuracy is very high.

2.IR value is digital type, easy to read.

3.One person can operate very easily.

4.Works perfectly even at very congested space.

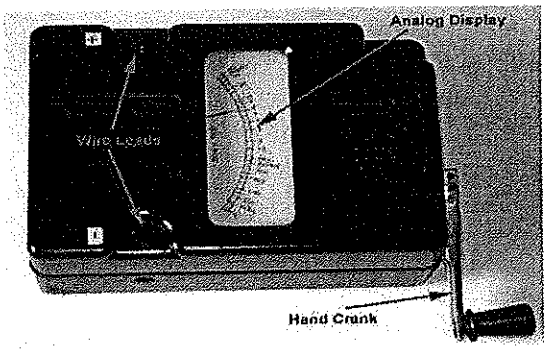
5.Very handy and safe to use.

Disadvantages of Electronic Type Megger

1.Require an external source of energy to energies i.e. Dry cell.

2.Costlier in market.

Hand Operated Megger



Important parts: -

Analog display: - Analog display provided on front face of tester for IR value recording.

Hand Crank: - Hand crank used to rotate helps to achieve desired RPM required generate voltage which runs through electrical system.

Wire Leads: - Used same as in electronic tester i.e. For connecting tester with electrical system.

Advantages of Hand Operated Megger

1.Still keeps important in such high-tech world as it's an oldest method for IR value determination.

2.No external source required to operate.

3.Cheaper available in market.

Disadvantages of Hand Operated Megger

1.At least 2 person required to operate i.e. one for rotation of crank other to connect megger with electrical system to be tested.

2.Accuracy is not up to the level as it's varies with rotation of crank.

3.Require very stable placement for operation which is a little hard to find at working sites.

4.Provides an analog display result.

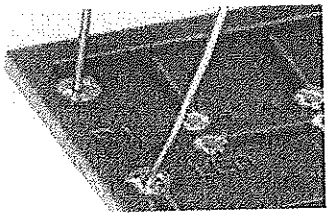
5.Require very high care and safety during use of the same.

Q.3. What is soldering? Explain the soldering procedure with appropriate diagram.

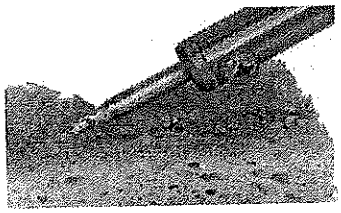
Ans. Soldering joints are weakest joints in comparison of brazing and welding. It cannot bear the load. It is generally use to make electrical contacts. Temperature requirement is up to 450 degrees Centigrade in Soldering joints. No change in mechanical properties after joining. Cost involved is very low. Preheating of work pieces before soldering is good for making good quality joint.

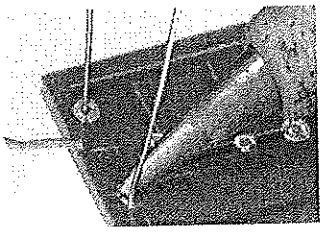
Process of soldering

1. Place the component into the board.
2. Bend the legs of component.



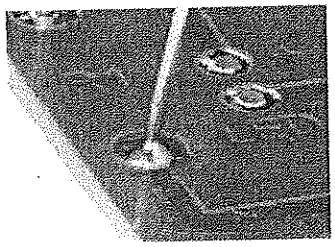
3. Make sure the soldering iron has warmed up. There should be a soldering iron cleaner.

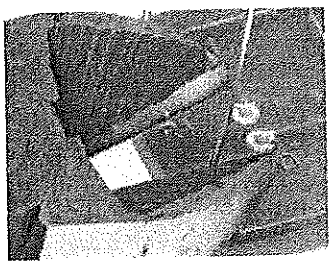


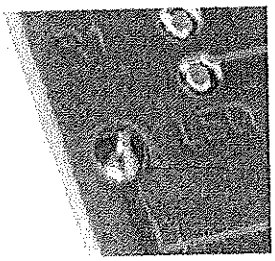


4. Pick up the Soldering Iron in one hand, and the solder in the other hand.

5. Feed a small amount of solder into the joint. The solder should melt on the pad and flow around the component leg.







6. Remove the solder, then remove the soldering iron.

7. Leave the joint to cool for a few seconds, then using a cutters trim the excess component lead.

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School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
1st In-Sem. Examination

Course Code: ELE 1105 **Time: 1 Hour**
Course Name: Electrical Safety **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

Q.1. The resistance of dry human body is between:

(a) 0 – 100 Ω (b) 100 Ω – 1000 Ω
(c) 1000 Ω - 10000 Ω (d) 50000 Ω – 100000

Q.2. Arc flash tested panels will blow the fault:

(a) Upwards (b) Sideways (c) both A and B (d) None of these

Q.3. Which agents are used for electrical fire quenching?

(a) CO_2 (b) FM 200 (c) Inert Gases (d) All of these

Q.4. For the electrical circuits the value of earth resistance should be less than:

(a) 1 Ω (b) 2 Ω (c) 10 Ω (d) 1000 Ω

Q.5. The approved class E hard hat is suitable for the electrical voltage up to:

(a) 11 kV (b) 3.3 kV (c) 6.6 kV (d) All of these

Section – B

03X02 = 06 Marks

Q.1. What is the benefits of lockout and tagging in the process of electrical shutdown?

Q.2. What are the benefits of LLF in the industry?

Q.3. Why the water is not being used for extinguishing electrical fire?

Section – C

03X03 = 09 Marks

Q.1. What are the two basic reasons of an electrical accident? Please explain the same with appropriate examples.

Q.2. What are the reasons of electrical fire?

Q.3. What is importance of PPEs? Please write the names of all the PPEs used by electricians.

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School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
1st In-Sem. Examination

Course Code: ELE 1105
Course Name: Electrical Safety

Time: 1 Hour
Max. Marks: 20

Section – A

05X01 = 05 Marks

Q.1. The resistance of dry human body is between:

(a) 0 – 100 Ω (b) 100 Ω – 1000 Ω
(c) 1000 Ω - 10000 Ω (d) 50000 Ω – 100000 Ω

Ans. (d)

Q.2. Arc flash tested panels will blow the fault:

(a) Upwards (b) Sideways (c) both A and B (d) None of these

Ans. (a)

Q.3. Which agents are used for electrical fire quenching?

(a) CO_2 (b) FM 200 (c) Inert Gases (d) All of these

Ans. (a)

Q.4. For the electrical circuits the value of earth resistance should be less than:

(a) 1 Ω (b) 2 Ω (c) 10 Ω (d) 1000 Ω

Ans. (b)

Q.5. The approved class E hard hat is suitable for the electrical voltage up to:

(a) 11 kV (b) 3.3 kV (c) 6.6 kV (d) All of these

Ans. (d)

Section – B

03X02 = 06 Marks

Q.1. What is the benefits of lockout and tagging in the process of electrical shutdown?
Ans. Lockout is the physical way to ensure that the energy source is de-energized. Tagging is an important part of lockout. Tags are means of communication. They are used to inform others that the device is locked out, who has locked out it and why? Tag devices and systems must not b re-energized without the authority of those named on the tag.

Q.2. What are the benefits of LLF in the industry?
Ans. The LLF stands for Look, Listen and Feel. By this process the supervisors notice the abnormal conditions, abnormal sounds and high temperature in the electrical equipment. Which helps in advance to avoid a big breakdown by doing timely rectification of the abnormalities.

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Q.3. Why the water is not being used for extinguishing electrical fire?

Ans. The water is a good conductor of electricity. If we use the water for extinguishing electrical fire, then the electrical can travel through our body and can cause injury to us. Therefore, water should not be thrown for extinguishing electrical fire.

Section – C 03X03 = 09 Marks

Q.1. What are the two basic reasons of an electrical accident? Please explain the same with appropriate example.

Ans. The two basic reasons are as follows:

1. Unsafe act:

   Example: If a person is working on the electrical system without taking proper shutdown then it is the unsafe act of and electrician.

2. Unsafe condition:

   Example: If a person is working on the HT pole without using full body harness. It creates unsafe condition for an electrician.

Q.2. What are the reasons of electrical fire?

Ans. Electrical fire takes place or originates due to the following reasons:

Short Circuit/ leakage, faults in wiring/ cabling or equipment.

Damage of cables/ wires during installation

Poor quality of cables/ wires

Inherent fault in equipment

Installations with PVC propagate fire causing dense and toxic smoke

Excessive heating of electrical equipment either due to continuous over load or loose contact.

Continuous over loading

Lose contacts in switch gear or at terminals, improper cable termination.

Mechanical/ electrical failures of switching equipment

Improper operations due to failure of switchgear contacts and insulation degradation

Such failures particularly related to switchgear contacts and insulation degradation go unnoticed if the system is in operation but erupt when switching is done.

Air conditioning of buildings is another cause of concern as the central AC system ducts can propagate fire form one area to another very fast unless proper care is taken.

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Q.3. What is importance of PPE? Please write the names of all the PPE used by electricians.

Ans. PPE is used to minimize and mitigate the **risks and hazards** of a wide variety of working conditions. Without proper PPE, workers are left exposed to significant risk of injury or illness. These risks include:

- Electrical shock
- Mechanical hazards (to limbs, digits, head, etc.)
- Chemical burn or poison
- Fire
- Radiation exposure
- Falling from the heights

Some of the more common PPE **gear** includes:

- Hard hats
- Gloves
- Safety glasses / eye goggles
- Earmuffs / earplugs
- Work boots or protective footwear
- Respirators
- Full Body Harness
- Phase tester