Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills

3rd Semester, 2nd In-Sem. Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: ELE1301 **Time: 1 Hour**

Course Name: Electrical Assembly Operator Control Panel **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.

Section – A

05X01 = 05 Marks

Q.1. Which of the following materials is used in the power circuit conductors inside the industrial control panel in accordance with UL 508A.

(a) Brass (b) Aluminum (c) Copper (d) Copper-Nickel Alloy

Q.2. Which of the following is not a valid stop category in control circuits?

(a) Category 0 (b) Category 1 (c) Category 2 (d) Category 3

Q.3. In accordance with UL 508A, what should be the temperature withstanding capacity of the internal conductors of the control circuit cable used in industrial applications?

(a) 60° C (b) 70° C (c) 80° C (d) 90° C

Q.4. Which one of the following is a code for multiple conductors with thermoplastic insulation?

(a) 1xxxx (b) 2xxxx (c) 3xxxx (d) 4xxxx

Q.5. According to the NFPA 79, the cables used in the interconnection of devices on the machine in a non-vertical run, are supported for every:

(a) 11 inches (b) 12 inches (c) 13 inches (d) 14 inches

Section – B

03X02 = 06 Marks

Q.1. What are the different types of cable drums generally used?

Q.2. Give two applications of the external raceways (ducts)?

Q.3. What are criteria followed in selecting the operating modes for a machine?

Section – C

03X03 = 09 Marks

Q.1. Explain different categories of STOP functions used in the control circuits?

Q.2. Mention any four unintentional or unexpected machine movements seeking Protective measures according to ISO 12100?

Q.3. What are the different protective measures to be taken for cables subjected to severe duties?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills

3rd Semester, 2nd In-Sem. Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: ELE1301 **Course Name: Electrical Assembly Operator Control Panel**

Solution

Section – A 05X01 = 05 Marks

Q.1. Which of the following materials is used in the power circuit conductors inside the industrial control panel in accordance with UL 508A.

(a) Brass (b) Aluminum (c) Copper (d) Copper-Nickel Alloy

Ans. (c)

Q.2. Which of the following is not a valid stop category in control circuits?

(a) Category 0 (b) Category 1 (c) Category 2 (d) Category 3

Ans. (d)

Q.3. In accordance with UL 508A, what should be the temperature withstanding capacity of the internal conductors of the control circuit cable used in industrial applications?

(a) 60° C (b) 70° C (c) 80° C (d) 90° C

Ans. (d)

Q.4. Which one of the following is a code for multiple conductors with thermoplastic insulation?

(a) 1xxxx (b) 2xxxx (c) 3xxxx (d) 4xxxx

Ans. (b)

Q.5. According to the NFPA 79, the cables used in the interconnection of devices on the machine in a non-vertical run, are supported for every:

(a) 11 inches (b) 12 inches (c) 13 inches (d) 14 inches

(b) Ans. (b)

Section – B 03X02 = 06 Marks

Q.1. What are the different types of cable drums generally used?

Ans. The types of cable drums generally used are:

- **Cylindrical ventilated**
- **Radial ventilated**
- **Radial non-ventilated**

Q.2. Give two applications of the external raceways (ducts)?

- **Ans. The conductors of an AC circuit to an item of equipment shall be routed in the same cable raceway**
- **The conductors external to the control panel shall be routed in raceways as described in NFPA 79**

Q.3. What are criteria followed in selecting the operating modes for a machine?

Ans. The operating modes for a machine are defined according to the following criteria:

- **Type of machine**
- **Area of application (automatic and manual operation, service and maintenance, setup mode, etc.)**

BSDU

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Section – C 03X03 = 09 Marks

Q.1. Explain different categories of STOP functions used in the control circuits?

Ans.

Category	Aspects		
	Energy supply	Delay	Stopping
Category 0 stop	Immediate interruption	Uncontrolled	No control
Category 1 stop	Interruption once the specified position is Reached	Controlled delay via the control system	No control
Category 2 stop	No interruption	Controlled delay via the control system	Ensured by the actuator control system

Q.2. Mention any four unintentional or unexpected machine movements seeking Protective measures according to ISO 12100?

Ans. Protective measures are required in the following cases to prevent unintentional or unexpected machine movements:

- **Cancelation of a locked-off condition**
- **Fault in the power supply**
- **Battery replacement**

Loss of control signals with cable less control systems

Q.3. What are the different protective measures to be taken for cables subjected to severe duties?

Ans. Cables subjected to severe duties shall be protected against the following influences:

- **Abrasion due to sharp edges**
- **Kinking due to operation without guides**
- **Stress due to guide rollers, forced guiding, and being wound and rewound on cable drums**
- **The cables shall be handled in such a way that the tensile load is kept to a minimum during operation. The manufacturer's specifications shall be observed.**

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills
3rd Semester, 2nd In-Sem. Examination
B. Voc. Program, Summer Semester (2018-19)

Course Code: ELE1302 **Time: 1 Hour**

Course Name: Electrical Design Developer **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.

Section – A

05X01 = 05 Marks

Q.1. Which of the following does not change in transformer?

(a) Current (b) Voltage (c) Frequency (d) All of above

Q.2. A transformer core is laminated to: -

(a) Reduce hysteresis loss (b) Reduce eddy current loss

(c) Reduce copper loss (d) Reduce all losses

Q.3. What is the name of insulating oil used in transformer?

(a) Mineral oil (b) Crude oil

(c) Vegetable oil (d) None of the above

Q.4. The permissible flux density in case of cold rolled grain oriented steel is around: -

(a) 1.7 Wb/m^2 (b) 2.7 Wb/m^2 (c) 3.7 Wb/m^2 (d) 4.7 Wb/m^2

Q.5. Which of the following is not a part of transformer installation?

(a) Conservator (b) Breather (c) Buchholz Relay (d) Exciter

Section – B

03X02 = 06 Marks

1. Derive the EMF equation of transformer?
2. Why high voltage (HV) side is open circuited and low voltage (LV) side is short circuited in open circuit and short circuit test?
3. A transformer has 500 turns of the primary winding and 10 turns of the secondary winding. Determine the secondary voltage if the secondary circuit is open and the primary voltage is 120 V.

Section – C

03X03 = 09 Marks

1. What are the different types of cooling provided in the transformer?
2. Mention the classification of insulation provided in the transformer?
3. Write short note on:
   (a) Short circuit test on transformer
   (b) Core and shell type transformer

Solution

Code:-
ELE 1302

Course Name -
Electrical Design Developer

3rd Sem. B.Voc.
2nd In Sem answer
Given by :- Mr. Sourabh Rat
EDD Solutio

* Answers

Ans 1 - (c) Frequency
2 - (b) Reduce Eddy current
3 - (a) Mineral
4 - (a) 1.7 Wb/m^2.
5 - (d) Exciter

"Section"

Ans 1 E.M.F Equation :-
Let N_1 no. of turns in primary,
N_2 no. of " " secondary,
ϕ_m max. flux in the core (Wb)
f is frequency of A.C.

We know that when A.C. supply is given to any core, flux gets max value in cycle i.e. in 1/4 se
∴ Average charge of flux = $4 f \phi_m$ per sec.

Form factor :- $\frac{\text{R.M.S value}}{\text{Average}} = 1.11$

∴ Per turn induced emf = $1.11 \times 4 \phi_m f$ volts.

Teacher's Signature

E.M.f induced in $N_p \Rightarrow E_p = 4.44 \phi_m f N_p$ volts.

$\Rightarrow E_s = 4.44 \phi_m f N_s$ volts.

In terms of flux primary $\Rightarrow E_p = 4.44 B_{max} A f N_p$

in Secondary $E_s \Rightarrow 4.44 B_{max} f N_s A$.

Ans 2 :⇒ Short circuit :⇒ In a transformer short-circuit test is done to find copper losses at rated load current, if possible. The maximum current allowed to flow during short-circuit is rated current.
Theortically, one winding has to shorted and power, voltag and current have to measured. So, practically it is more convenient to supply a smaller current and use a wattmt of lower current rating if the low voltage winding is shorted. Note that the voltage required to pass the rated current is about 5% to 10% of the rated voltage.

Open Circuit ⇒ Total losses include no-load copper loss & core loss. During O.C current flowing in L.V. winding magnetizing current which is very small. So, the cu losses are neglected. The core losses are only considered. Core losses are proportional to square of voltage. So, low volt side is connected to supply and H.V. left open.

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Ans3 $N_p = 500$

$N_s \Rightarrow 10$

$E_p \Rightarrow 120\ V$

$E_s \Rightarrow$ _____ ?

As per ~~EMF~~ transformer ratio :⇒

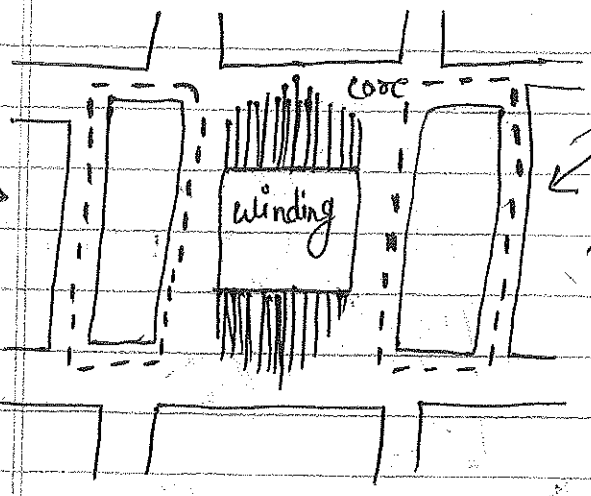
$$\frac{N_p}{N_s} = \frac{E_p}{E_s} = k.$$

$$\frac{500}{10} = \frac{120}{E_s} = 2.4\ V.$$

Section 'C'

Ans 1 ⇒ There are four types of cooling for the transformer.

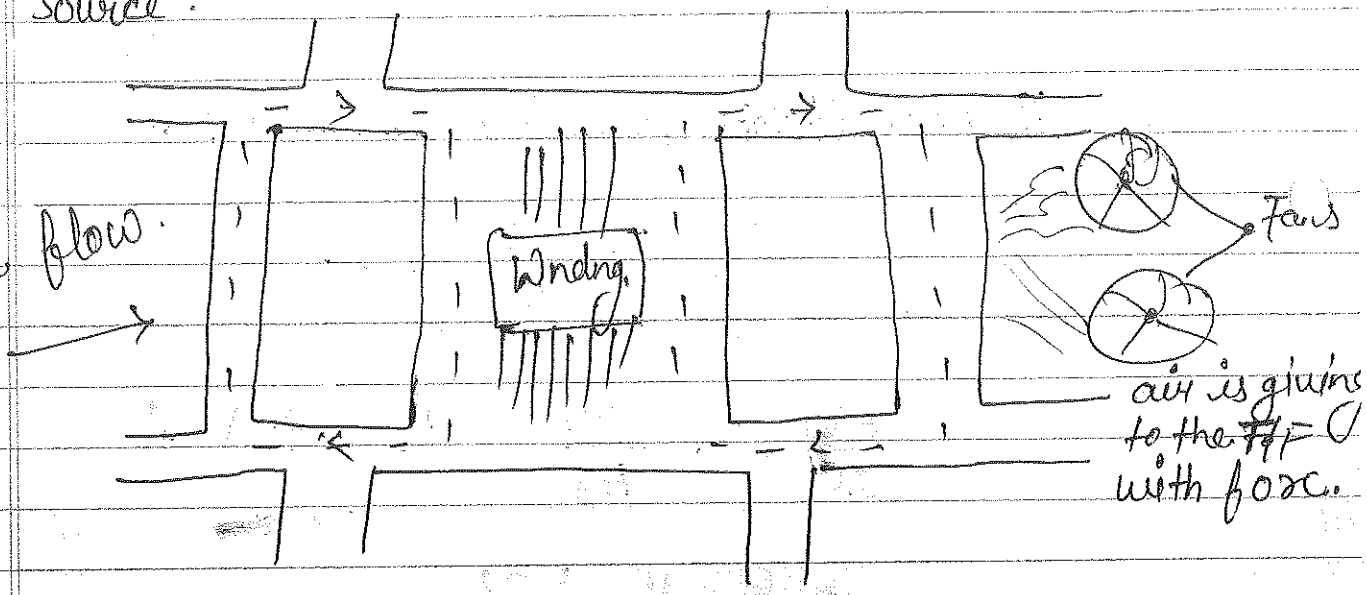
(i) ONAN :- it stands for oil natural air natural cool In this method the oil of transformer, is cooled through the natural air.



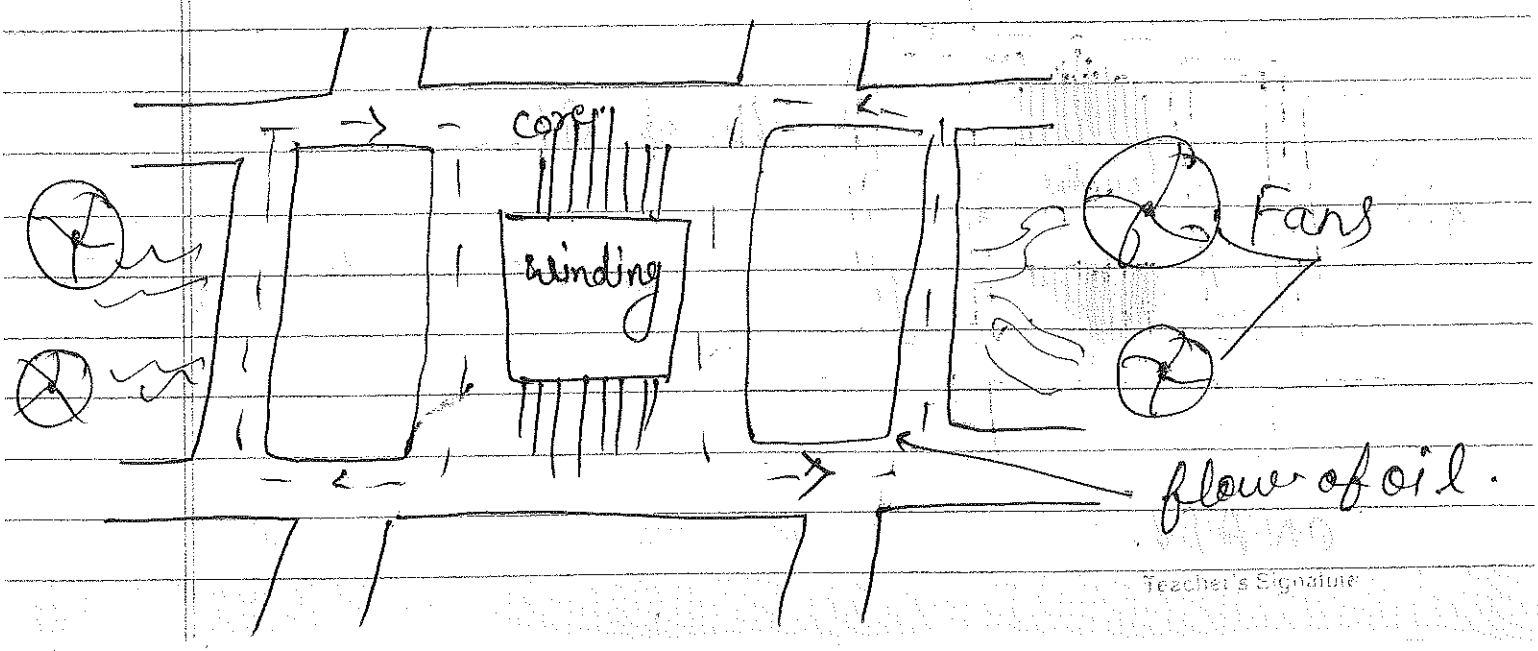
ONAN.

Teacher's Signature

(ii) ONAF :- it stands for oil natural air force.
in this type of cooling, the oil flows in convictional direction and air is forcly flowed by some extena source.



(iii) OFAF :- it stands for oil forced air forced.
In this method, the oil is forcly flowed by pumping in convictional direction and air is forcly flowed by fan.



Teacher's Signature

(iv) OFWF :- It stands for oil forced water forced The oil flow in its convectional direction while the water is used forcly to cool the Transformer

Ans 2 There are various types of insulation used in transformer. →

Class	→	Temperature
Y	→	90°
A	→	105°
E	→	120°
B	→	130°
F	→	155°
H	→	180°
C	→	180° above

These insulating material are neither impraganated no imerged in oil.

* Class 'A' – Material of class Y impraganated with natural resins for example – Cellilose, esters, and insulating oils.

* Class 'E' – synthetic resins enambes cotton and paper laminated with formaldihyde bonding.

* Class 'B' – Mica, glass, fibre, esbates with carbonic bonding materials. 130°C.

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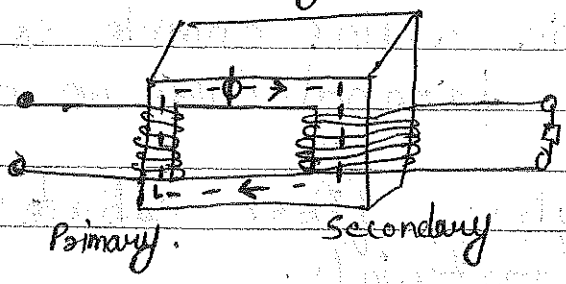
Ans3 * Short - Circuit Test :→

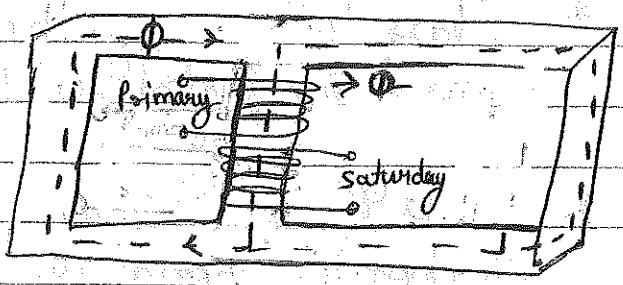
* The test is conducted on the high voltage side of transformer where the low-voltage side or the secondary is short circuited.
* Whenever a fault occurs on network such that low cont flows in one or more phases, a short-circuit is said to have occurred.
* To prove that identical transformer of similar design can withstand external short-circuits without any damage to test.
* To ensure reliable and safe operation at site.
* Generally, it is done to find out the variable losses with shorting the secondary or load side to see - full-load losses.

* Core type and Shell type...

* Core type transformer is wounded on core while shell type windings are covered the core.
* Core type windings are easy to remove, shell type winding can't be easily removed and are hard in view of maintenance



Core type transformer



Shell type Transformer.

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills

3rd Semester, 2nd In-Sem. Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: ELE1303 **Time: 1 Hour**

Course Name: Safety Electrical Installation Controller **Max. Marks: 20**

Instructions: 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.

Section – A

05X01 = 05 Marks

Q.1. Active first-aid treatment for heat exhaustion to be: -

(a) take the patient to cooler conditions in the fresh air

(b) lay him down and loose all clothing around neck

(c) Sprinkle cold water on the neck and head to stimulate

(d) All of the above

Q.2. A person qualified to perform electrical work must possess: -

(a) Skills/techniques to distinguish live parts from other parts of electrical equipment.

(b) Skills and techniques to determine the nominal voltage of exposed live parts.

(c) Knowledge on the use of PPE, insulating and shielding materials, and insulated tools.

(d) All of the above.

Q.3. During the first-aid burns should be treated by: -

(a) Burns dressing (b) Covering the burns to exclude air

(c) Both a and b (d) None of these

Q.4. Which IS is applicable for the portable Extinguishers for their performance and construction specifications?

(a) IS 325 (b) IS 15683 (c) IS 9001 (d) None of these

Q.5. Where to locate CO_2 Extinguishers?

(a) at the man gate (b) at the reception

(c) near to the source of the fire risk (d) All of the above

Section – B

03X02 = 06 Marks

Q.1. How to operate a CO_2 fire extinguisher?

Q.2. Name the factors to be eliminated which are causing the fire?

Q.3. What do you understand by First-Aid?

Section – C

03X03 = 09 Marks

Q.1. Which fire Extinguisher types are used for each class of fire?

Q.2. What items should be kept in a basic first-aid box?

Q.3. What steps you will follow for the treatment of your colleague who has suffered with an Electrical shock?

Course Code- ELE 1303

Course Name→ Safety Eletrical Installation Controller

2nd In- Sem Examination

'Answer key'

Ans 1 - (d) - All of the above

Ans 2 - (d) All of the above

Ans 3 - (c) both 'a' and 'b'

Ans 4 - (b) IS IS 683

Ans 5 - (c) near to the source of fire risk.

"Section B"

Ans 1. Simply follow the following steps "PASS":

(a) P - Pull the pin

(b) A - Aim the nozzle low

(c) S - Squeze the handle, lever

(d) S - Sweep.

Ans 2 Eliminate one of three factors causing fire.

(a) Heat :- By cooling water etc.

(b) Oxygen :- by smothering and exclusion of air.

(c) Fuel :- is eliminated by segregation, cooling or smothering.

Ans 3 :- First Aid means what one should do to reduce the suffering of the patient after an accident until the doctor arrives, it may give life to dying person.

"Section 'C'"

Ans 1

Class type / Extinguishers	Class 'A' Combustible materials - paper & wood	Class 'B' Flammable liquids → paint & petrol	Class 'C' Flammable gases → methane	Class 'D' Flammable metals → potassium	Class 'E' Electrical equipments :- generators.	Class 'F' Kitchen fat fryers → chips pans.
Water	✓	X	X	X	X	X
Dry Powder	✓	✓	✓	✓	✓	X
FOAM	✓	✓	X	X	X	X
CO_2	X	✓	X	X	✓	X
Wet	✓	X	X	X	X	✓

The different types of extinguishers tackle different types of fire to extinguish.

Ans 2 → some basic items contained in a first-aid-box are as follows :-

- Plasters in a variety of different sizes and shapes.
- small, medium and large sterile gauze dressings
- at least two eye sterile eye dressings.
- triangular bandages.
- Crepe rolled bandanges
- Safety pins.

- disposable sterile gloves.
- Tweezers
- scissors
- alchol - free cleansing wipes
- Sticky - tape
- Thermometer
- Skin rash - creams
- Cream or spray to relieve insect bites and stings
- antiseptic cream
- Penkillers like paracetamol
- Cough syrup or medicine
- eye wash and eye bath.

Treatment for electric shock...

Ans 3

First when a person get contacted into shock, just try to remove him with some insulator otherwise you may also get shock but before it, we have to switch off the supply
When attempting to free a person from contact with low or medium voltage use rubber gloves, shoes or mat. After releasing, As soon released the victim, if he is feeling breathless, rapidly feel with your finger in his mouth and throat and remove any foreign matter (like tobbacco etc) Then begin artificial respiration. Keep loosening the clothes of victim and keep the victim warm.
Place the patient with face downwards, head turned

slightly to one side, with arm raised and bent.
Give him artificial breath so that he may live or can catch his breath again.
Repeat the complete cycle twelve times to the minute.
- Send the patient for medical help.
- Never give water to the patient.
Keep by standards away from the patients
Keep the patient warm.