Instrumentation and Control
AIAC 012 008

012 Install and service electrical and electronic equipment
008 Assemble electrical components and appliances

Assessment Tool

Learner Name:		Signed:	
Telephone No.:		Date:	
Marks:	Maximal total marks		
	Obtained marks		
	Total obtained marks in percentage	%	
Learner Is:	q Competent q Not Yet Competent		
Occupation Safety and Health Considerations	Follow Health, Safety and Environment ACT 2007 of Kenya.		
Instructor Name:		Signed:	

Assignment

Task: IAC 012, Element 8: Assemble electrical components and appliances		Duration : 12 hours
Job Statement	Electrical components functions and appliances of the Siemens LOGO! Controller	
Performance Criteria	· Identification of components and appliances · Constructional features, principles of operation and functions of components and appliances · Analysis connecting points and joints · Selection of components and appliances	
Resources Required	**List of Recommended Resources** · User Manual Siemens LOGO! https://cache.industry.siemens.com/dl/files/461/16527461/att_82564/v1/Logo_e.pdf · Siemens Online E-Learning https://sitrain.automation.siemens.com/sitrain/open_wbt/logo/tutorial/menu.html?mode=standalone	
Name of Developer	**Dr. Lawrence Mukhongo,** **TUM, June 2017**	

Overview of LOGO! Functions

LOGO! provides you with various elements in programming mode. In order to maintain the overview, we have organized the elements in 'Lists'. These lists are:

- ↓Co: Connectors
  Connectors represent inputs (I1, I2 …), outputs (Q1, Q2 …), flags and constant voltage levels (constants).

- ↓GF: Basic functions AND, OR,
  The GF list contains the basic function blocks you can use for your circuit program. Basic functions represent simple logical elements of Boolean algebra. You can invert the inputs of individual basic functions, that is, the circuit program inverts a logical "1" at a relevant input to a logical "0"; if "0" is set at the input, the program sets a logical "1"..

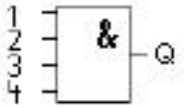
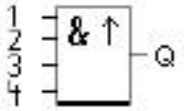
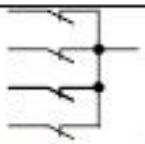
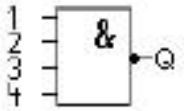
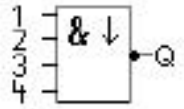
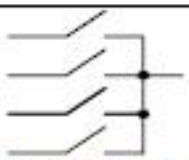
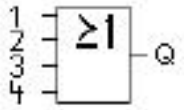
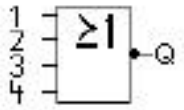
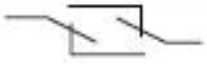
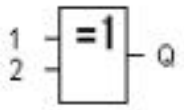
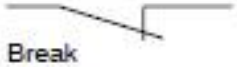
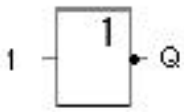
- ↓SF: Special functions
  Because of their different input designation, there is a difference between the special functions and basic functions. SFs contain timer functions, retentive functions and various parameter assignment options, which allow you to adapt the circuit program to suit your own requirements.

- ↓BN: Reusable blocks configured in the circuit program

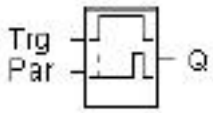
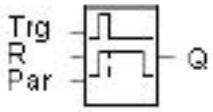
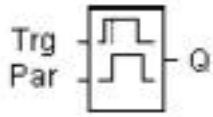
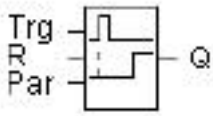
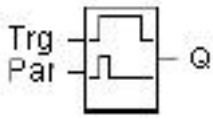
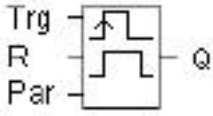
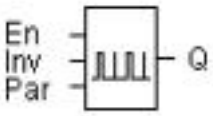
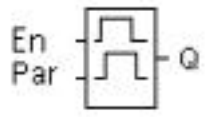
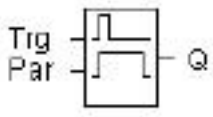
If LOGO! does not show all elements:

- No further blocks may be added. This is either an indication of insufficient memory space or that the maximum number of blocks has been reached.
- A specific block's memory space requirement would exceed the space available in LOGO!

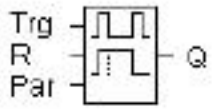
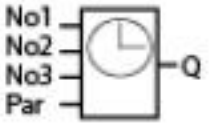
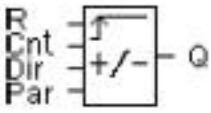
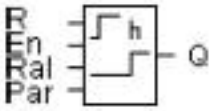
Overview Basic functions -- GF

View in the circuit diagram	View in LOGO!	Name of the basic function
 Series circuit make contact		AND (see page 106)
		AND with edge evaluation (see page 106)
 Parallel circuit with break contacts		NAND (not AND) (see page 107)
		NAND with edge evaluation (see page 108)
 Parallel circuit with make contacts		OR (see page 109)
 Series circuit with break contacts		NOR (not OR) (see page 109)
 Double changeover contact		XOR (exclusive OR) (see page 110)
 Break contact		NOT (negation, inverter) (see page 111)

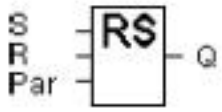
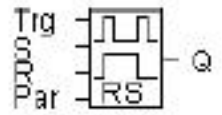
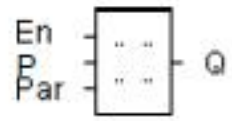
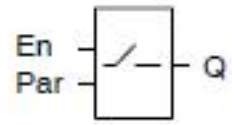
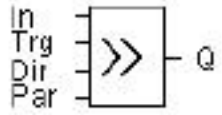
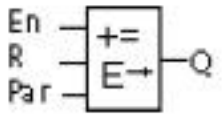
Overview Special functions – SF (page 1)

View in LOGO!	Name of the special function	Rem
Times		
	On-delay (see page 120)	REM
	Off-delay (see page 123)	REM
	On-/Off-delay (see Page 124)	REM
	Retentive on-delay (see page 126)	REM
	Wiping relay (pulse output) (see page 127)	REM
	Edge triggered wiping relay (see page 128)	REM
	Asynchronous pulse generator (see Page 130)	REM
	Random generator (see page 132)	
	Stairway lighting switch (see page 134)	REM

Overview Special functions – SF (page 2)

View in LOGO!	Name of the special function	Rem
	Multiple function switch (see page 136)	REM
	Weekly timer (see Page 139)	
	Yearly timer (see Page 143)	
Counter		
	Up/down counter (see Page 149)	REM
	Hours counter (see page 152)	REM
	Threshold trigger (see Page 156)	

Overview Special functions – SF (page 3)

	Latching relay (see Page 174)	REM
	Pulse relay (see Page 175)	REM
	Message texts (see Page 177)	
	Softkey (see Page 189)	REM
	Shift register (see Page 192)	REM
	Analog math error detection (see Page 212)	

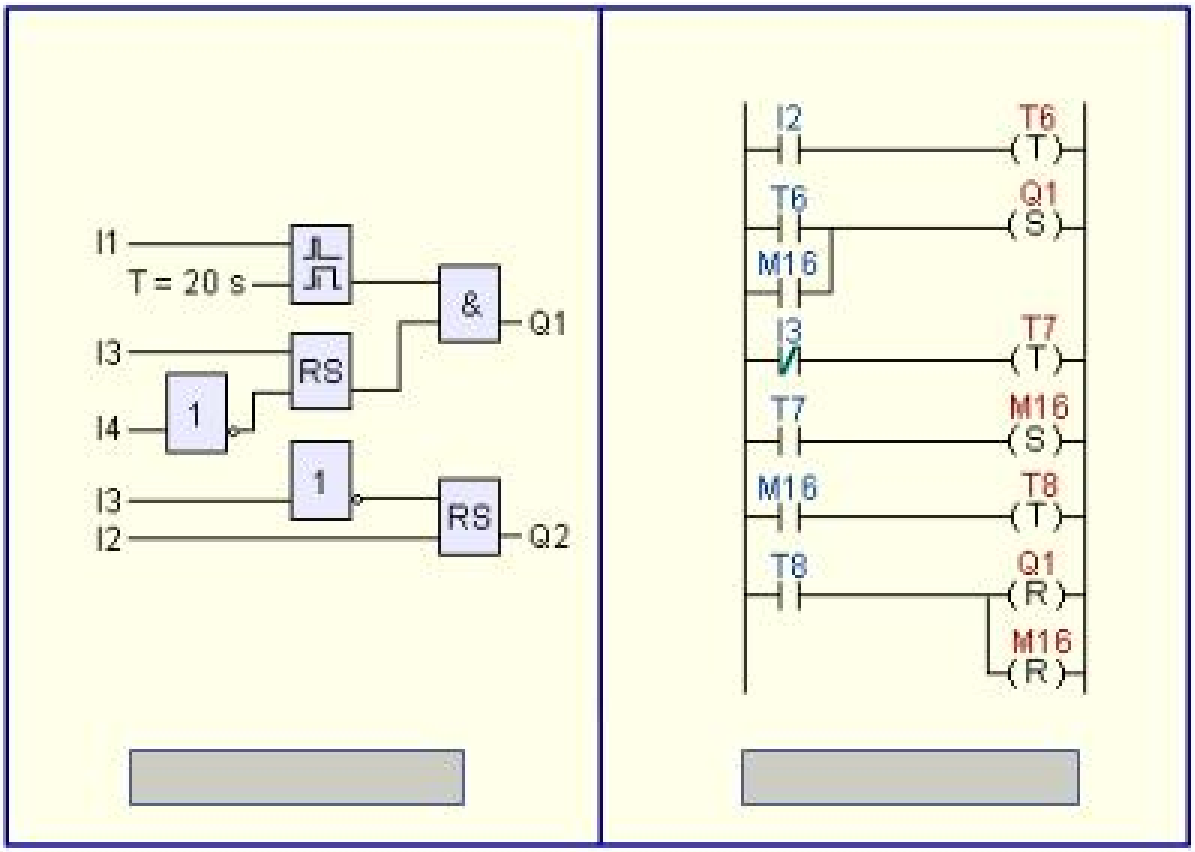
Practical Assessment:

Task 1:

Match the designations

- Functions Block
- Ladder Diagram

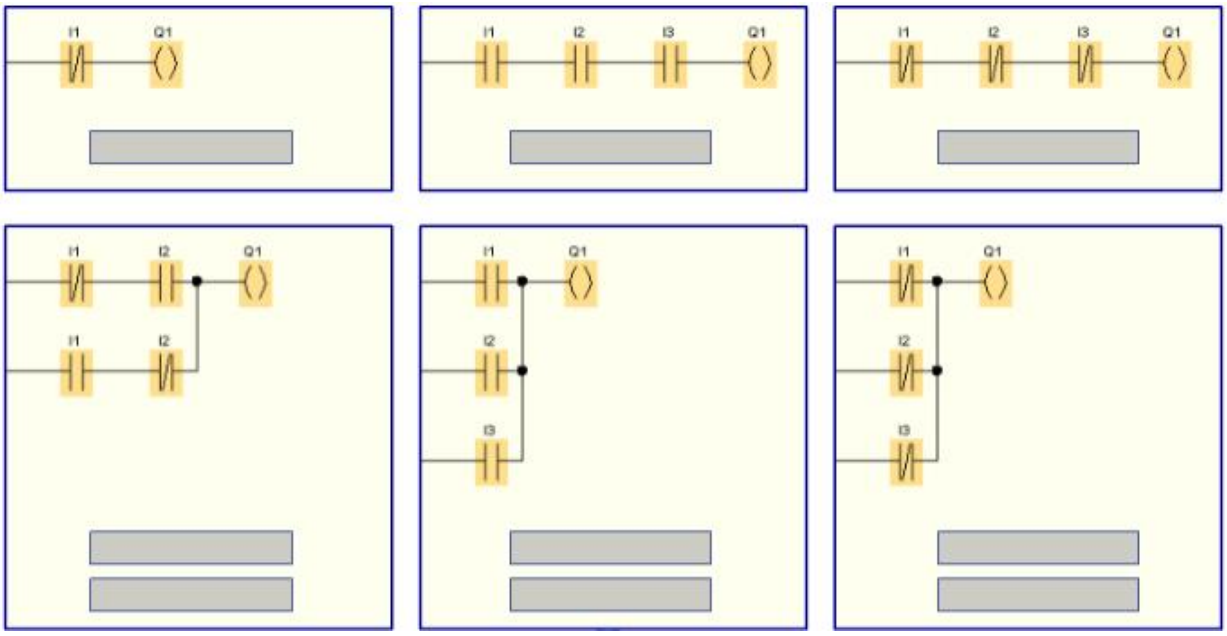
to the circuit diagrams below



Practical Assessment:

Task 2:

Below you can see some basic circuits in ladder diagram view. Assign the appropriate function equations to the ladder diagrams. Several solutions may be possible, but this is not imperative.



$Q_1 = \overline{I1} + \overline{I2} + \overline{I3}$

$Q_1 = I1 \cdot I2 \cdot I3$

$Q_1 = \overline{I1} \cdot \overline{I2} \cdot \overline{I3}$

$Q_1 = (I1 \cdot \overline{I2}) + (\overline{I1} \cdot I2)$

$Q_1 = \overline{I1}$

$Q_1 = \overline{I1 \cdot I2 \cdot I3}$

$Q_1 = \overline{I1 + I2 \cdot I3}$

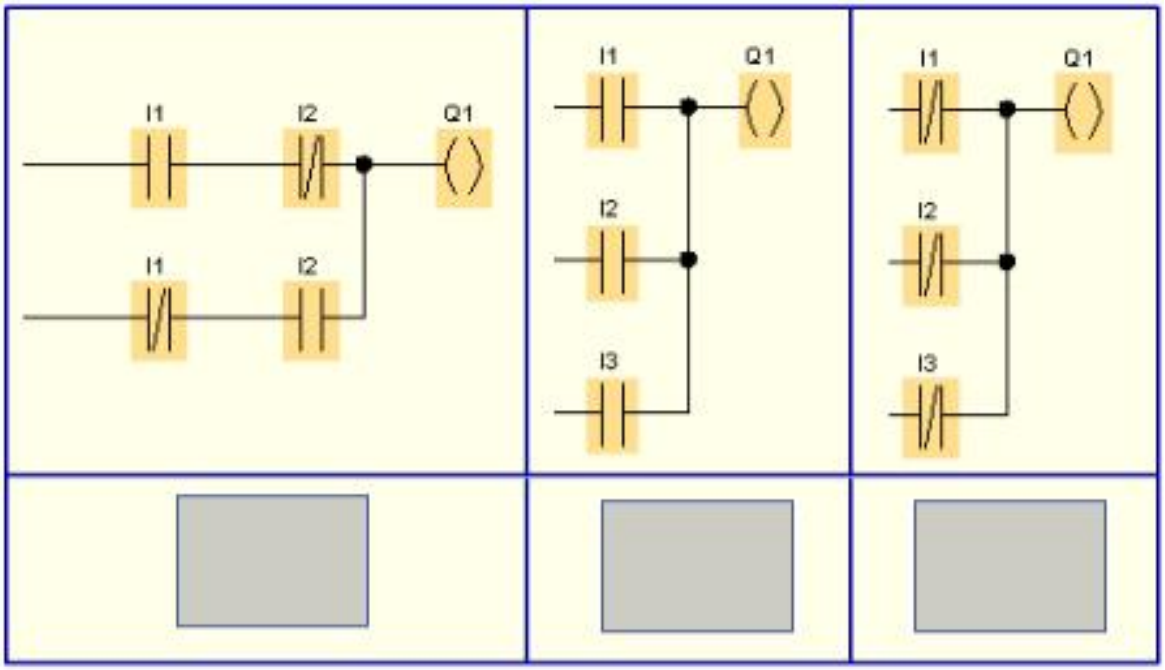
$Q_1 = \overline{\overline{I1} \cdot \overline{I2} \cdot \overline{I3}}$

$Q_1 = I1 + I2 + I3$

Practical Assessment

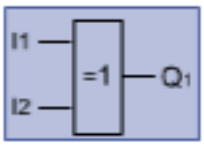
Task 3:

Below you can see some basic circuits in ladder diagram view. Assign the appropriate function to the ladder diagrams.

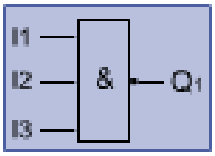


Functions:

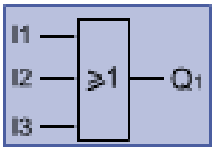
A



B



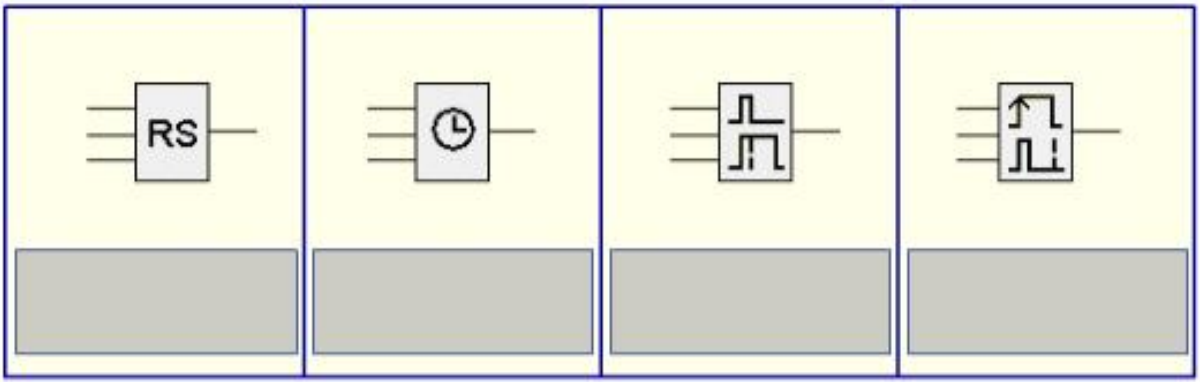
C



Practical Assessment

Task 4:

Assign the appropriate function designation to the views.



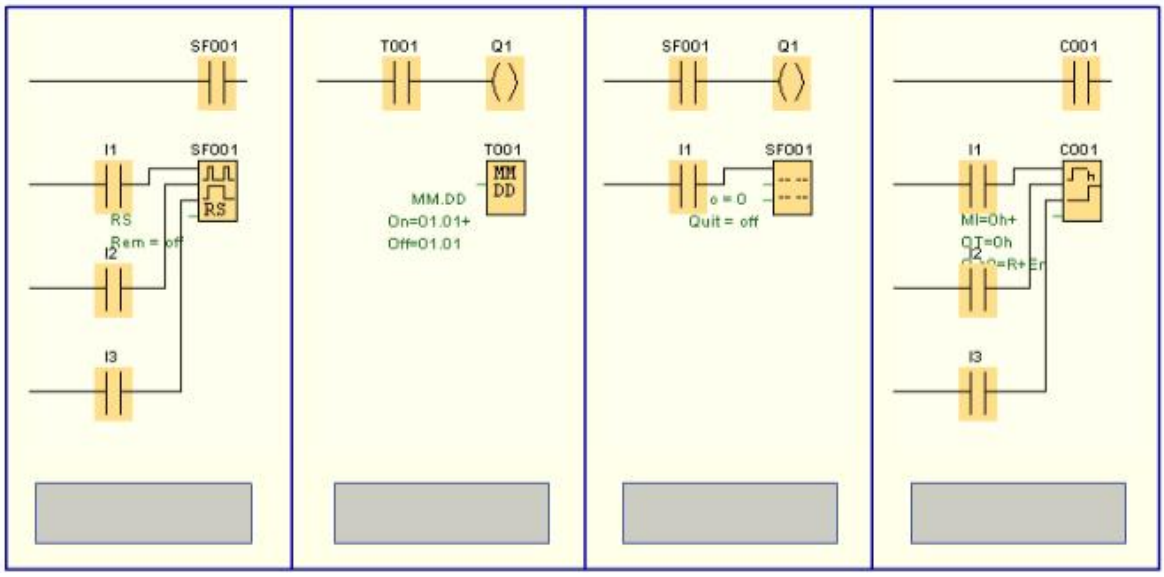
Functions:

A	B	C	D
Flank triggered Interval time delay relay	Switch off delay	Lock up relay	Weekly time switch

Practical Assessment

Task 5:

Assign the appropriate function designation to the views.



Functions:

A Message text

B Annual time switch

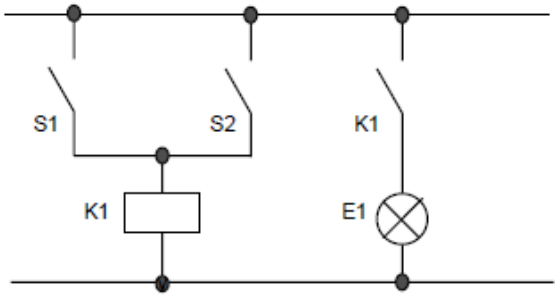
C Operating hours

D Current surge relay

Practical Assessment

Task 6:

Below you will see a circuit diagram. Find the LOGO solution and create for this circuit the functions block diagram.



Practical Assessment

Task 7:

A bottle filling machine is to be controlled. The conveyor control is switched ON or OFF using (I1). When the conveyor control is switched ON, the motor for the conveyor belt (Q1) runs. The motor is able to be switched off at any time with an Emergency switch (I3)

Find the LOGO solution and create for this requirement

a) The circuit diagram and
b) The functions block diagram.

Assessment Checklist

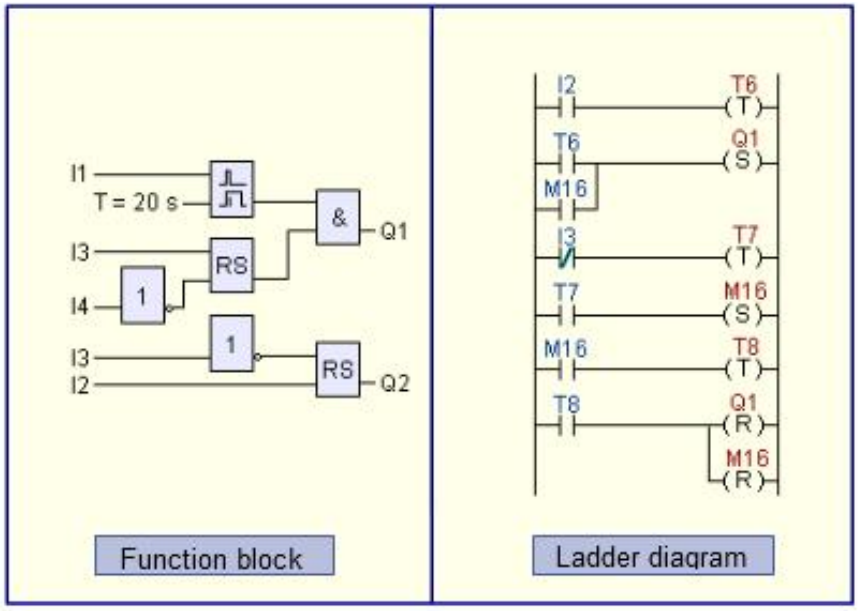
Learner ID and Name:			
Assessment	AIAC 012 008 SAC Functions	Date:	

Items to be Evaluated	Tolerance	C	NYC
The student knows functions blocks and ladder diagrams (Task 1)			
The student assigns the appropriate function equations to ladder diagrams. (Task 2 – 5)			
The student converts circuit diagrams into LOGO function blocks (Task 6)			
The student is able to find a solution for different requirement of industrial, applications and is able to create function diagrams (Task 7)			
Remarks			

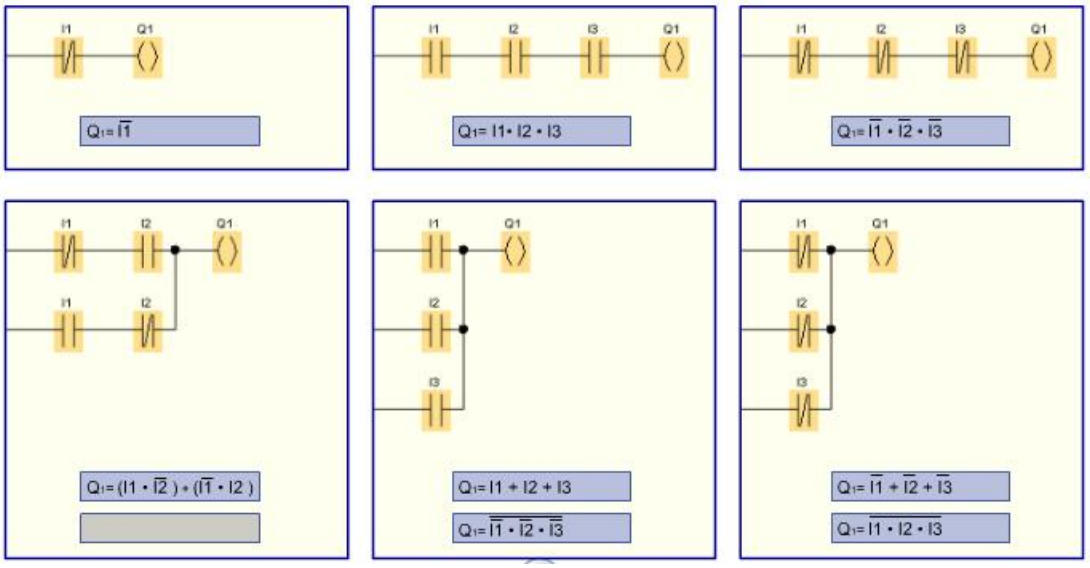
Learner is	q Competent q Not Yet Competent
Occupation Safety and Health Considerations	Follow Health, Safety and Environment ACT 2007 of Kenya.
Name and Signature of Instructor/Assessor	

Sample Answers - Practical Assessment:

Task 1:

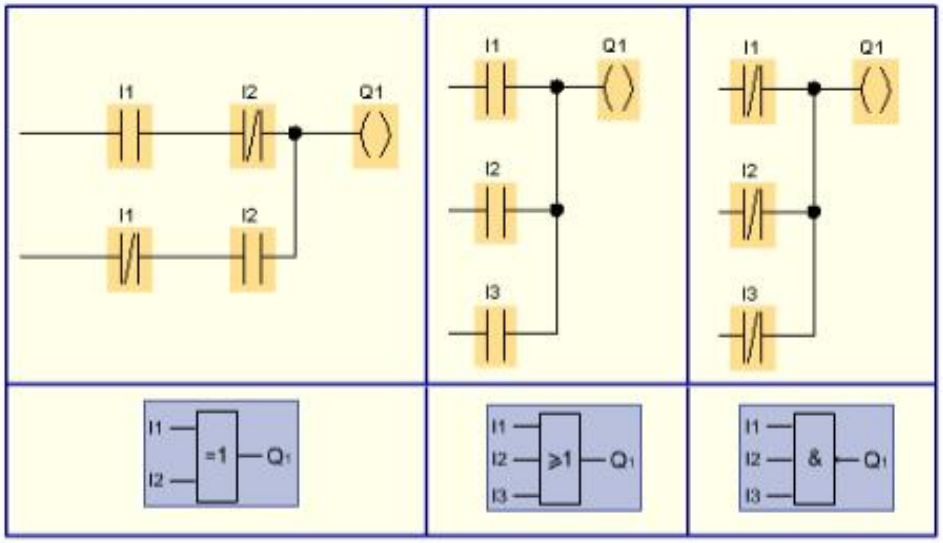


Task 2

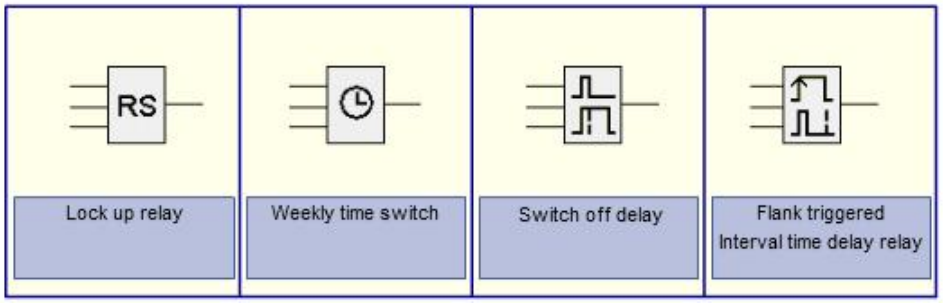


Sample Answers - Practical Assessment:

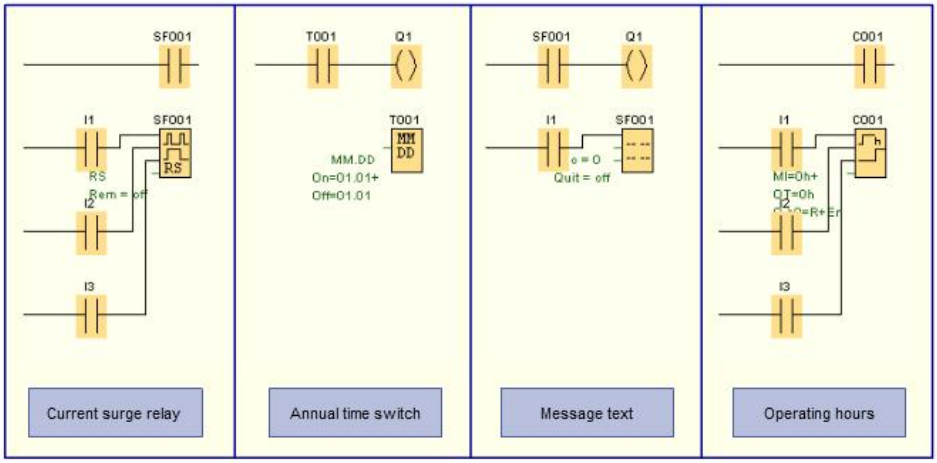
Task 3:



Task 4

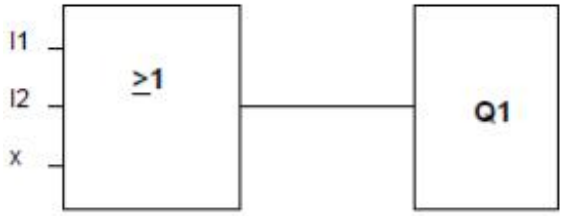


Task 5



Sample Answers - Practical Assessment:

Task 6:



Task 7