

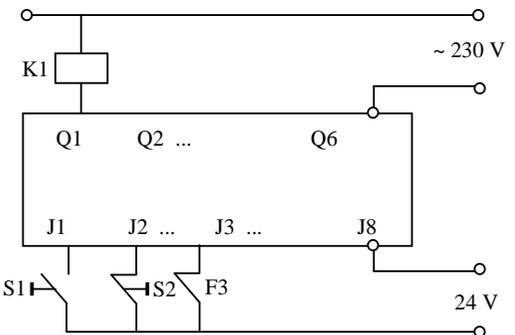
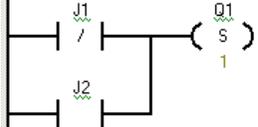
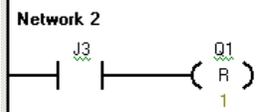
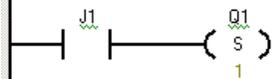
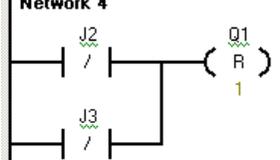
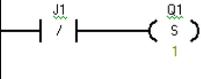
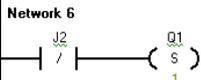
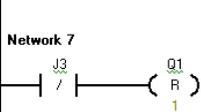
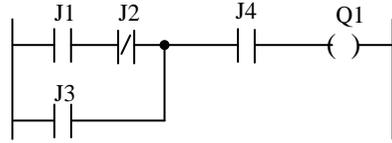
Examination questions for the course in “Programmable logic controllers”

Operational level			
Programmable logic controllers			
Questions			
O/T – specifies the nature of the question (O - obligatory, T - time demanding)			
No.	O/T	Question	Correct answer
1.	O	What does a variable in a controller stand for: A. data type, B. a data item whose value may change in the course of the controller’s operation, C. a data item whose value is scalar.	<div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; text-align: center; margin: 0 auto;">B</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div>
2.	O	Variable type defines the set of values a given variable may assume. An INT type variable means that the variable may assume: A. integral values, B. real values, C. logical values.	<div style="border: 1px solid black; width: 40px; height: 20px; text-align: center; margin: 0 auto;">A</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div>
3.	O	How many areas is the memory of an S7-1200 controller divided into: A. 5 areas: input (I), output (Q), bit memory (M), data block (DB), and temporary memory (L), B. 6 areas: input (I), output (Q), bit memory (M), data block (DB), local memory (L), and temporary memory (L), C. 3 areas: input (I), output (Q), data block (DB).	<div style="border: 1px solid black; width: 40px; height: 20px; text-align: center; margin: 0 auto;">A</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div>
4.	O	A controller offers usually ROM, RAM, and EEPROM memory. Programmes are stored in: A. ROM, B. RAM and EEPROM, C. EEPROM.	<div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; text-align: center; margin: 0 auto;">B</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div>

5.	O	<p>Access address to a single bit in a memory area includes:</p> <p>A. bit number, B. memory area ID, byte address, and bit number, C. byte address and bit number.</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; flex-direction: column; align-items: center; justify-content: center;"> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%; text-align: center;">B</div> <div style="width: 100%; height: 100%;"></div> </div>
6.	O	<p>Access address to a byte in a memory area includes:</p> <p>A. area ID, data size label (DW), and the initial word address (W), e.g. MDW15, B. area ID, data size label (W), and the initial word address (W), e.g. QW8, C. area ID, data size label (B), and the initial byte address (B), e.g. IB0.</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; flex-direction: column; align-items: center; justify-content: center;"> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%; text-align: center;">C</div> <div style="width: 100%; height: 100%;"></div> </div>
7.	O	<p>Composite types:</p> <p>A. are composites of types of the same kind, B. are composites of types of different kind, C. are composites of data of different kind.</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; flex-direction: column; align-items: center; justify-content: center;"> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%; text-align: center;">B</div> <div style="width: 100%; height: 100%;"></div> </div>
8.	O	<p>A structure is a composite type that:</p> <p>A. is composed of data of different type, e.g. elementary data types, B. is composed of data of the same type, e.g. CHAR type, C. is a multidimensional array containing elements of the same type.</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; flex-direction: column; align-items: center; justify-content: center;"> <div style="width: 100%; height: 100%; text-align: center;">A</div> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%;"></div> </div>
9.	O	<p>How many times will the following FOR loop execute? FOR INDEX:= 1 TO 50 BY 2 DO END_FOR;</p> <p>A. 50, B. 25, C. 26.</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; flex-direction: column; align-items: center; justify-content: center;"> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%; text-align: center;">B</div> <div style="width: 100%; height: 100%;"></div> </div>
10.	O	<p>A WHILE loop is executed until the loop execution condition is:</p> <p>A. the number of executed steps does not equal the number declared, B. false, C. true.</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; flex-direction: column; align-items: center; justify-content: center;"> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%; text-align: center;">C</div> </div>
11.	O	<p>A REPEAT/UNTIL loop is executed until the loop execution condition is:</p> <p>A. false, B. true, C. the number of executed steps equals the number declared.</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; flex-direction: column; align-items: center; justify-content: center;"> <div style="width: 100%; height: 100%; text-align: center;">A</div> <div style="width: 100%; height: 100%;"></div> <div style="width: 100%; height: 100%;"></div> </div>

12.	O	<p>PTO is an output with modulation of:</p> <ul style="list-style-type: none"> A. frequency, B. phase, C. amplitude. 	<div style="border: 1px solid black; padding: 2px; text-align: center;">A</div> <div style="border: 1px solid black; height: 15px; margin: 2px;"></div> <div style="border: 1px solid black; height: 15px; margin: 2px;"></div>
13.	O	<p>A PWM output provides a square wave of a fixed period and variable duty cycles, which is achieved by changing the:</p> <ul style="list-style-type: none"> A. pulse amplitude, B. pulse height, C. pulse width. 	<div style="border: 1px solid black; height: 15px; margin: 2px;"></div> <div style="border: 1px solid black; height: 15px; margin: 2px;"></div> <div style="border: 1px solid black; padding: 2px; text-align: center;">C</div>
14.	O	<p>One of the equipment features of a PLC is compatibility with an RTD module. The module is used to:</p> <ul style="list-style-type: none"> A. connect temperature detectors such as thermocouples, solid state sensors, or resistance sensors (e.g. Pt100, Pt1000, Ni100), B. connect resistance temperature detectors (e.g. Pt100, Pt1000, Ni100), C. connect thermocouples. 	<div style="border: 1px solid black; height: 15px; margin: 2px;"></div> <div style="border: 1px solid black; padding: 2px; text-align: center;">B</div> <div style="border: 1px solid black; height: 15px; margin: 2px;"></div>
15.	O	<p>HSCs (<i>High Speed Counters</i>) used in a controller make it possible to:</p> <ul style="list-style-type: none"> A. count the number of internal high-frequency pulses, B. count the number of internal high-frequency pulses, measure the frequency and the period of square signals, C. measure the frequency only. 	<div style="border: 1px solid black; height: 15px; margin: 2px;"></div> <div style="border: 1px solid black; padding: 2px; text-align: center;">B</div> <div style="border: 1px solid black; height: 15px; margin: 2px;"></div>
16.	O	<p>Local variables can be defined as follows:</p> <ul style="list-style-type: none"> A. local variables are variables that can be used only by one subprogram (procedure, block) in an application, B. local variables are variables that can be used by any subprogram (procedure, block) in an application, C. local variables are variables that are forbidden for a given subprogram (procedure) in an application. 	<div style="border: 1px solid black; padding: 2px; text-align: center;">A</div> <div style="border: 1px solid black; height: 15px; margin: 2px;"></div> <div style="border: 1px solid black; height: 15px; margin: 2px;"></div>
17.	O	<p>Local variables:</p> <ul style="list-style-type: none"> A. have to have different names in different programs (procedures), B. may have the same names in different programs (procedures), C. have to have the same names in different programs (procedures). 	<div style="border: 1px solid black; height: 15px; margin: 2px;"></div> <div style="border: 1px solid black; padding: 2px; text-align: center;">B</div> <div style="border: 1px solid black; height: 15px; margin: 2px;"></div>

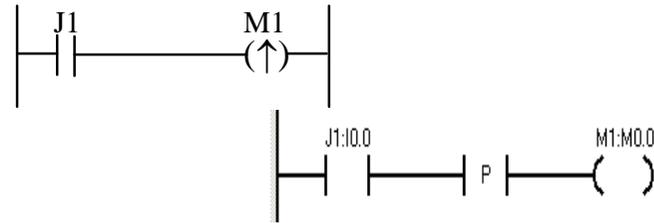
18.	O	<p>A COMPACT type PLC is composed of the following modules:</p> <ul style="list-style-type: none"> A. CPU, MEMORY, INPUT MODULE, OUTPUT MODULE, POWER SUPPLY, B. MASTER, SLAVE, CPU, MEMORY, POWER SUPPLY, C. MULTIVIBRATOR, INPUT MODULE, OUTPUT MODULE, POWER SUPPLY. 	<div style="border: 1px solid black; padding: 5px; width: 40px; margin: auto;">A</div>
19.	O	<p>Timers, counters, registers, flags belong to:</p> <ul style="list-style-type: none"> A. user memory, B. internal resources, C. process data memory. 	<div style="border: 1px solid black; padding: 5px; width: 40px; margin: auto;">B</div>
20.	O	<p>A simplified operating cycle of a PLC has been shown in point:</p> <p>A. input scan → execute program</p> <p style="margin-left: 100px;">↑</p> <p style="margin-left: 150px;">↓</p> <p style="margin-left: 150px;">diagnostics</p> <p style="margin-left: 100px;">↓</p> <p>output set ← communication,</p> <p>B. input scan → communication</p> <p style="margin-left: 100px;">↓</p> <p style="margin-left: 100px;">output set</p> <p style="margin-left: 100px;">↓</p> <p>execute program ← diagnostics,</p> <p>C. diagnostics → output set</p> <p style="margin-left: 100px;">↑</p> <p style="margin-left: 100px;">↓</p> <p>input scan ← execute program.</p>	<div style="border: 1px solid black; padding: 5px; width: 40px; margin: auto;">A</div>

21.	O	<p>The figure shows a system of electric engine control:</p>  <p>where: S1 – start button contact – NO S2 – stop button contact – NZ F3 – thermal relay contact (block) – NZ</p> <p>In order for the system to work correctly, it is necessary to introduce program:</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="470 702 728 1069"> <p>Network 1</p>  <p>Network 2</p>  <p>A.</p> </div> <div data-bbox="761 702 1041 1069"> <p>Network 3</p>  <p>Network 4</p>  <p>B.</p> </div> <div data-bbox="1064 702 1265 1069"> <p>Network 5</p>  <p>Network 6</p>  <p>Network 7</p>  <p>C.</p> </div> </div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; text-align: center; line-height: 40px;">B</div>
22.	O	<p>What logical function does the program below execute?</p>  <p>A. $Q1 = (J1 + \overline{J2}) \cdot J3 + J4$, B. $Q1 = (J1 \cdot \overline{J2} + J3) \cdot J4$, C. $Q1 = (J1 + \overline{J2} \cdot J3) + J4$.</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; text-align: center; line-height: 40px;">B</div>

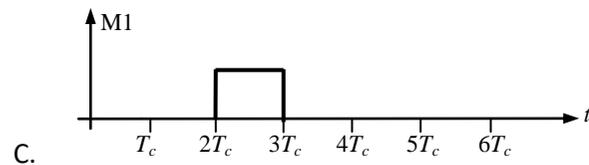
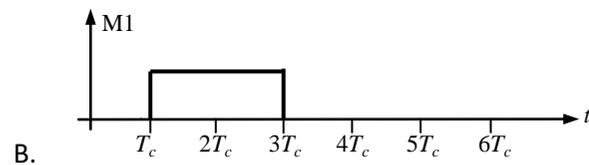
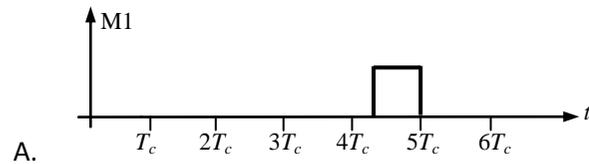
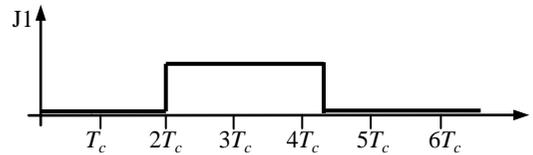
23.

O

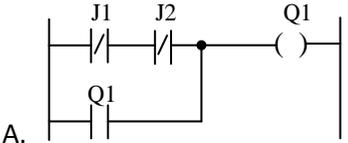
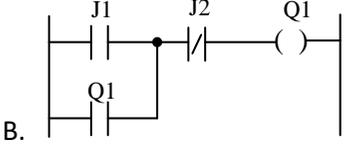
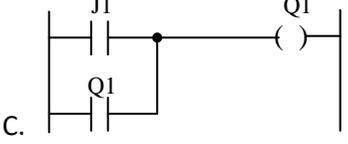
A program containing a relay (instruction) reacting to transitions has been placed in a controller's memory. The figure shows two equivalent solutions.



Please indicate the correct timing diagram illustrating the effect of relay M1 if input J1 has a timing diagram as shown below:



C

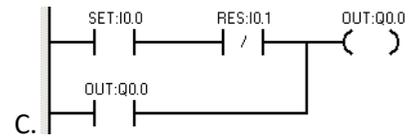
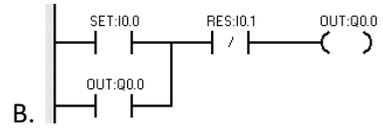
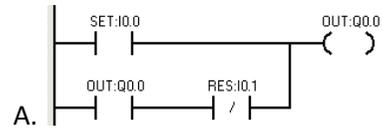
24.	O	<p>Which of the programs executes the function of a latching system (J1 – start, J2 – stop):</p> <p>A. </p> <p>B. </p> <p>C. </p>	<table border="1" style="width: 100%; height: 100%; text-align: center;"> <tr><td style="height: 20px;"> </td></tr> <tr><td style="height: 20px;">B</td></tr> <tr><td style="height: 20px;"> </td></tr> </table>		B	
B						
25.	O	<p>A safe start of a control system based on a PLC controller involves:</p> <p>A. entering state 1 in the controller's input, B. entering state 0 in the controller's input, C. entering any state (0 or 1) in the controller's input,</p>	<table border="1" style="width: 100%; height: 100%; text-align: center;"> <tr><td style="height: 20px;">A</td></tr> <tr><td style="height: 20px;"> </td></tr> <tr><td style="height: 20px;"> </td></tr> </table>	A		
A						
26.	O	<p>A safe stop of a control system based on a PLC controller involves:</p> <p>A. entering state 1 in the controller's input, B. entering state 0 in the controller's input, C. entering any state (0 or 1) in the controller's input,</p>	<table border="1" style="width: 100%; height: 100%; text-align: center;"> <tr><td style="height: 20px;"> </td></tr> <tr><td style="height: 20px;">B</td></tr> <tr><td style="height: 20px;"> </td></tr> </table>		B	
B						
27.	O	<p>Defects in the block module of a controller and in actuators can be identified by applying:</p> <p>A. a doubled number of outputs, B. feedback of the output signal in one of the inputs, C. actuator redundancy.</p>	<table border="1" style="width: 100%; height: 100%; text-align: center;"> <tr><td style="height: 20px;"> </td></tr> <tr><td style="height: 20px;">B</td></tr> <tr><td style="height: 20px;"> </td></tr> </table>		B	
B						

28.	O	<p>In a temperature monitoring system based on a PLC, a temperature monitoring relay with an output signal of $4 \div 20$ mA has been used. The relay should be connect to:</p> <p>A. a binary input of the controller, B. an analogue current input of the controller, C. an input for thermocouples.</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <div style="border: 1px solid black; height: 15px; width: 100%;"></div> <div style="border: 1px solid black; height: 15px; width: 100%; text-align: center;">B</div> <div style="border: 1px solid black; height: 15px; width: 100%;"></div> </div>
29.	O	<p>Select the PLC random access memory area set that offers the right labelling:</p> <p>A. I – binary inputs, Q – binary outputs, M – internal binary variables, AQ – analogue outputs, IA – analogue inputs, B. R – internal variables, registers, AQ – analogue outputs, AI – analogue inputs, M – internal binary variable, I – binary inputs, C. IQ – analogue outputs, AI – analogue inputs, Q – binary outputs, I – binary input, M – system variable.</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <div style="border: 1px solid black; height: 15px; width: 100%;"></div> <div style="border: 1px solid black; height: 15px; width: 100%; text-align: center;">A</div> <div style="border: 1px solid black; height: 15px; width: 100%;"></div> </div>
30.		<p>A PLC's "Clock Memory" refers to:</p> <p>A. A byte of the real time clock, B. Memory deleted after a certain time, C. A system clock - a byte whose every bit changes the state at a certain frequency.</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <div style="border: 1px solid black; height: 15px; width: 100%;"></div> <div style="border: 1px solid black; height: 15px; width: 100%;"></div> <div style="border: 1px solid black; height: 15px; width: 100%; text-align: center;">C</div> </div>
31.		<p>The value of byte QB0 is 15. The value of bit Q0.3 is:</p> <p>A. 0, B. 1, C. 2.</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <div style="border: 1px solid black; height: 15px; width: 100%;"></div> <div style="border: 1px solid black; height: 15px; width: 100%; text-align: center;">B</div> <div style="border: 1px solid black; height: 15px; width: 100%;"></div> </div>

32.		<p>Choose the set that contains the label of a signal delaying relay</p> <p>A. TON, S_ODT, S_ODTS, B. TOF, S_PULSE, C. C_UP, TIME_VAL.</p>	<input type="text"/> <input type="text"/> <input type="text"/>
33.		<p>Indicate the correct address of an input bit variable:</p> <p>A: I0.9, B: IN1.0, C: I10.7.</p>	<input type="text"/> <input type="text"/> <input type="text" value="C"/>
34.		<p>Setting a PLC to MRES leads to:</p> <p>A. clearing the random access memory, B. deleting the user's program and clearing the memory of all areas, C. deleting the settings and the program.</p>	<input type="text" value="A"/> <input type="text"/> <input type="text"/>
35.		<p>"Resetting to factory settings" via the sequence of the position of a PLC switch leads to:</p> <p>A. clearing the random access memory, B. complete removal of the current settings and program of the PLC, C. restoring the original version of the program.</p>	<input type="text"/> <input type="text" value="B"/> <input type="text"/>
36.		<p>A momentary disconnection of the battery from the CPU module, or a battery replacement leads to:</p> <p>A. a loss of remembered data when the PLC is disconnected from the power supply, B. no negative consequences when the PLC is power supplied, C. suspension of program execution.</p>	<input type="text" value="A"/> <input type="text"/> <input type="text"/>
37.		<p>Damage of the CPU module of a PLC requires:</p> <p>A. replacing the CPU with a new one and acquiring new software from the manufacturer of the equipment, B. replacing the CPU and setting the system again, C. replacing the CPU, loading the controlling program and settings.</p>	<input type="text" value="A"/> <input type="text"/> <input type="text"/>
38.		<p>Removing a PLC MMC memory card is permitted when:</p> <p>A. the controller is in the STOP mode and is disconnected from the power supply, B. the controller is in the STOP mode, C. the controller is in any state.</p>	<input type="text" value="A"/> <input type="text"/> <input type="text"/>

39.

Which program shows memory involving mainly saving?



A