**Automation**

**Exercise 1**

1. Automation is a system of manufacture designed to extend the capacity of machines to perform certain tasks formerly done by humans, and to control sequences of operations without human intervention.
2. Such devices as automatic telephone switching equipment, automatic pilots, and automated guidance and control systems are used to perform various operations much faster or better than could be accomplished by humans.
3. Main factor pushed the development of automated manufacture is the wish to extend the capacity of machines to perform certain tasks formerly done by humans, and to control sequences of operations without human intervention.
4. That is, the reduction of a manufacturing or service process into its smallest independent steps.
5. The division of labor results in increased production and a reduction in the level of skills required of workers.
6. The next steps necessary for the development of automation were mechanization, simplification of labor , development of power transmission technology, development of energy technology, and the use of a transfer machine .
7. The development of power technology also gave rise to the factory system of production, because all workers and machines had to be located near the power source.
8. The transfer machine is a device used to move a work piece from one specialized machine tool to another, in such a manner as to properly position the work piece for the next machining operation.
9. Industrial robots are now extremely dexterous and are being used to transfer, manipulate, and index (that is, to position) both light and heavy workplaces, thus performing all the functions of a transfer machine.
10. The goal of this assembly-line system was to make automobiles available to people who previously could not afford them.

**Exercise 2**

1. Manufacture system designed to extend the capacity of machines is called Automation.
2. Automated manufacture arose out of division of labor and development of the factory.
3. The division of labor is, the reduction of a manufacturing or service process into its smallest qualifications steps.
4. Another step necessary in the development of automation was mechanization.
5. As a result of the development of power transfer specialized machines were motorized and their production efficiency was improved.
6. The development of power transfer technology also gave rise to the factory system of production.
7. The transfer machine is a device used to move a work piece from one specialized machine tool to another.
8. Industrial robots were originally designed only to perform simple tasks.
9. The goal of the assembly-line system was to make automobiles available to people who previously could not afford them.

**Exercise 3**

1. **False**
2. **False**
3. **True**
4. **False**
5. **False**
6. **True**
7. **True**
8. **False**
9. **True**
10. **False**

**Exercise 4**

1. Автоматизированная производственная линия состоит из серии рабочих станций, соединенных системой перемещения для перемещения деталей между станциями.
2. Современные автоматизированные линии управляются программируемыми логическими контроллерами.
3. Автоматизированные производственные линии используются во многих отраслях промышленности, особенно в автомобильной.
4. Если деталь производится серийно, автоматическая линия часто является наиболее экономичным способом производства.
5. Линии передачи датируются примерно 1924 годом.
6. Работы по прессу включают резку и формование деталей из листового металла.
7. Автоматизированная система предназначена для выполнения некоторых полезных действий, и это действие требует энергии.

**Exercise 5**

1. Electricity is the most widely used energy source in modern automated systems.
2. Automated systems perform basically two types of operations : 1) processing; 2) moving and positioning.
3. Automation is a production system designed to increase the productivity of machines and mechanisms.
4. Communications, aviation, and astronautics are the industries that make the most extensive use of automation.
5. The division of labor, power transfer and the mechanization of production has accelerated the development process of automation.
6. The next step required in the development of automation was mechanization.
7. The development of energy transfer technology has contributed to the development of automation.
8. Industrial robots were originally designed to perform simple tasks in dangerous environments.

**Feedback**

**Exercise 1**

1. By means of feedback principle a machine can be provided with the capacity for self-correction.
2. A feedback loop is a mechanical, pneumatic, or electronic device that senses or measures a physical quantity such as position, temperature, size, or speed, compares it with a preestablished standard, and takes whatever preprogrammed action is necessary to maintain the measured quantity within the limits of the acceptable standard.
3. The feedback principle was introduced in 1788.
4. An outstanding early example is the flyball governor, invented in 1788 by the Scottish engineer James Watt to control the speed of the steam engine.
5. In this device a pair of weighted balls is suspended from arms attached to a spindle, which is connected by gears to the output shaft of the engine. At the top of the spindle the arms are linked by a lever with a valve that regulates the steam input. As the engine speeds up beyond the desired rate, causing the spindle to rotate faster, the flyballs are driven upward by centrifugal force. The action of the flyballs partly closes the input valve, reducing the amount of steam delivered to the engine.
6. Yes, we can consider a household thermostat as a feedback device.
7. Through feedback devices, machines can start, stop, speed up, slow down, count, inspect, test, compare, and measure.
8. These operations are commonly applied to a wide variety of production operations that can include milling, boring, bottling, and refining.

**Exercise 2**

1. Automatic Control is not a new thing in the world/
2. Feedback principles have for long been used to generate inverse functions on analogue computers.
3. A mechanical device uses mechanical energy in the form of gears.
4. Pneumatic devices are effective in actuating MR-safe robotic systems.
5. Today, most electronic devices use semiconductor components to perform electron control.
6. We need to measure the physical quantities to obtain physical meaningful results to understand physics.
7. We must follow preestablished standard.
8. Function of environmental stimuli is to switch off inhibitory nature of brain and we see preprogrammed actions of behaviors occur.
9. It refers to the lower limits of acceptable standards for consumer products over the course of a number of inspections.
10. The tolerance limits would have to be defined by way of tolerance groups.
11. Physical characteristics are defining traits or features about your body.
12. These operations are commonly applied to a wide variety of production operations.

**Exercise 3**

1. Органы управления с обратной связью широко используются в современных автоматизированных системах.
2. Система управления с обратной связью состоит из пяти основных компонентов.
3. Вход в систему - это опорное значение, или уставка, для вывода системы.
4. Чувствительные элементы - это измерительные приборы, используемые в контуре обратной связи для контроля величины выходного сигнала.
5. Это устройство состоит из двух металлических полос, соединенных по своей длине.
6. Эти два металла обладают различными коэффициентами теплового расширения.
7. Биметаллическая лента способна измерять температуру.
8. Существует много различных видов датчиков, используемых в системах управления с обратной связью для автоматизации.
9. Назначение контроллера и исполнительных устройств в системе обратной связи заключается в сравнении измеренного выходного значения с эталонным входным значением и уменьшении разницы между ними.
10. В общем случае контроллер и исполнительный механизм системы - это механизмы, с помощью которых осуществляется изменение процесса для воздействия на выходную переменную.
11. Эти механизмы обычно разработаны специально для системы и состоят из таких устройств, как двигатели, клапаны, электромагнитные выключатели, поршневые цилиндры, шестерни, силовые винты, шкивные системы, цепные приводы и другие механические и электрические компоненты.