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PROFESSIONAL ORIENTED FOREIGN LANGUAGE

Methodological recommendations for practical use, for students of specialty 5B070200 – Automation and control

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This guideline is written to develop skills in reading and translating technical texts in the field of Automation and control. It includes professionally oriented text material, exercises and tasks for mastering terms and information on this specialty. The texts are in format of IELTS and TOEFL exam.

Reviewer: candidate of Philology, assistant professor V. Kozlov

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Text 1

A brief history of automata

Automation is a machine, usually made to resemble a person or animal that operates on its own, once it has been started. Although few are constructed nowadays, they have a history stretching back well over two thousand years. Several myths show that the ancient Greeks were interested in the creation of automata. In one, Hephaestus, the god of all mechanical arts, was reputed to have made two female statues of pure gold which assisted him and accompanied him wherever he went. As well as giving automata a place in mythology, the Greeks almost certainly created some. There were probably activated levers and powered by human action, although there are descriptions of steam and water being used as sources of power. Automata were sometimes intended as toys, or as tools for demonstrating basis scientific principles.

Others ancient cultures, too, seem to have developed automata. In Egypt, Ctesibius experimented with air pressure and pneumatic principles. One of his creations was a singing blackbird powered by water. A Chinese text of the third century BC described a life-size, human-shaped figure that could walk rapidly, move its head up and down, sing and wink its eyes.

Much later, Arab engineers of the ninth and thirteenth centuries wrote detailed treatises on how to build programmable musical fountains, mechanical servants, and elaborate clocks. A ninth-century ruler in Baghdad had a silver and gold tree with metal birds that sang. The art of creating automata developed considerably during the fifteenth century, linked with improvements in clock making: the mechanisms of automata and clocks had a great deal in common. Some truly remarkable automata were produced at this time. Muller was reputed to have made an artificial eagle which flew to greet Emperor on his entry into Nuremberg, Germany, in 1470, then returned to perch on top of a city gate and, by stretching its wings and bowing, saluted the emperor on his arrival. Leonardo da Vinci made a lion in honour of the king of France, which advanced towards him, stopped, opened its chest with a claw and pointed to the French coat of arms.

Automata were normally very expensive toys for the very rich. They were made for royal or aristocratic patrons, to be viewed only by themselves and selected guests – who were expected to be impressed by their wealth. Automata were also created for public show, however, and many appeared on clock towers, such as the one in Bern, Switzerland, built in 1530.

During the eighteenth century, some watchmakers made automata to contribute to the progress of medicine and the natural sciences, particularly to investigate the medical laws governing the structure and movement of living things. Many of their creations simulated almost perfectly the complex structure of human being and animals. Maillardet made extensive use of gearing and cogs to produce automata of horses, worked by turning a handle. Vaucanson produced a duck made of gilded copper which ate, drank and quacked like a real duck. He also made a life-size female flute player. Air passes through the complex mechanism, causing the lips and fingers of the player to move naturally on the flute, opening and closing holes on it. This automation had a repertoire of twelve tunes.

In another well-known piece, Merlin's silver swan made in 1773, the swan sits in a stream consisting of glass rods where small silver fish are swimming. When the clockwork is wound, a music box plays and the glass rods rotate, giving the impression of a flowing stream. The swan turns its head from side to side. It soon notices the fish and bends down to catch and eats one, then raises its head to the upright position. The mechanism still works.

One of the most skilled makers of automata was the Swiss watchmaker Jaquet-Droz. He produced three automata which, even today, are considered wonders of science and mechanical engineering. One of there, The Writer, simulates a boy sitting at the desk, dipping his pen into the ink and writing perfectly legibly.

Another stunning creation of the eighteen century was the Mechanical Theatre in the grounds of Austria's Hellbrunn Palace, home of the Archbishop of Salzburg. Designed by the miner Rosenegger, and completed in 1752, this depicts the nobility's idea of a perfect society, with every class in its proper place. The figures inside a palace depict eighteenth- century court life, industrious activity is carried on in and around this building. A total of 141 mobile and 52 immobile little figures demonstrate all manner of trades of the period: building workers bring materials to the foreman, who drinks; butchers slaughter an ox; a barber shaves a man. A dancing bear performs, guards march past the palace, a farmer pushes an old woman in a wheelbarrow over the road. The theatre shows great skill in clock making and water technology, consisting of hidden waterwheels, copper wiring and cogwheels.

During the nineteenth century, mass production techniques meant that automata could be made cheaply and easily, and they became toys for children rather than an expensive adult amusement. Between 1860 and 1910, small family business in Paris made thousands of clockwork automata and mechanical singing birds and exported them around the world. However, the twentieth century saw traditional forms of automata fall out of favor.

1. Questions 1-3.

Complete the summary below. Choose ONE WORD ONLY from the text to each answer.

Automata and the ancient Greeks

The ancient Greeks had a number of ____ (1) concerning automata. According to one, the god Hephaestus created two assistants made of gold. The Greeks probably also created real automata; it seems most likely that the mechanism which controlled them consisted of ____ (2) which were worked by human operators. Some automata were designed to be ____ (3) with an educational purpose.

2. Questions 4-8.

Look at the following descriptions and the list of people below. Match each statement with the correct person, A-G

List of description

4) created an automation that represented a bird in water, increasing with its surroundings

5) created an automation that performed on a musical instrument

6) produced documents about how to create automata

7) created automata which required a human beings to operate the mechanism

8) used air and water power

List of people

a) Ctesibius

b) Arab engineers

c) da Vinci

d) Maillardet

e) Vaucanson

f) Merlin

g) Jaquet-Droz

3. Questions 9-13.

Complete the sentences below. Choose ONE WORD ONLY from the text for each answer.

9) The Mechanical Theatre shows count line inside a ____

10) In the Mechanical Theatre, building workers, butchers and a barber represent various ____ of the time

11) ____ provides the power that operates the Mechanical Theatre

12) New ____ that developed in the nineteenth century reduced the cost of the production of automata

13) During the nineteenth century, most automata were intended for use by ____

Text 2

Robots at work

A) The newspaper production process has come a long way from the old days when the paper was written, edited, typeset and ultimately printed in one building with the journalists working on the upper floors and the printing presses going on the ground floor. These days the editor, subeditors and journalists who put the paper together are likely to find themselves in a totally different building or maybe even in a different city. This is the situation which now prevails in Sydney. The daily paper is compiled at the editorial headquarters, known as the prepress center, in the heart of the city, but printed far away in the suburbs at the printing centre. Here human beings are in the minority as much of the work is done by automated machines controlled by computers.

B) Once the finished newspaper has been created for the next morning's edition, all the pages are transmitted electronically from the prepress centre to the printing centre. The system of transmission is an update on the sophisticated page facsimile system already in use on many other newspapers. An image setter at the printing centre delivers the pages as film. Each page takes less than a minute to produce, although for colour pages four versions, once each for black, cyan, magenta and yellow are sent. The pages are then processed into photographic negatives and the film is used to produce aluminium printing plates ready for the presses.

C) A procession of automated vehicles is busy at the new printing centre where the Sydney Morning Herald is printed each day. With lights flashing and warning horns honking, the robots (to give them their correct name, the LGVs or laser guided vehicles) look for all the world like enthusiastic machines from a science fiction movie, as they follow their own random paths around the plant busily getting on with their jobs. Automation of this kind is now standard in all modern newspaper plants. The robots can detect unauthorized personnel and alert security staff immediately if they find an "intruder"; not surprisingly, tall tales are already being told about the machines starting to take on personalities of their own.

D) The robots' principal job, however, is to shift the newsprint (the printing paper) that arrives at the plant in huge reels and emerges at the other end sometime later as newspapers. Once the size of the day's paper and the publishing order are determined at head office, the information is punched into the computer and the LGVs are programmed to go about their work. The LGVs collect the appropriate size paper reels and take them where they have to go. When the press needs another reel its computer alerts the LGV system. The Sydney LGVs move busily around the press room fulfilling their two key functions to collect reels of newsprint either from the reel stripping stations, or from the racked supplies in the newsprint storage area. At the stripping station the tough wrapping that helps to protect a reel of paper from rough handling is removed. Any damaged paper is peeled off and the reel is then weighed.

E) Then one of the four paster robots moves in. Specifically designed for the job, it trims the paper neatly and prepares the reel for the press. If required the reel can be loaded directly onto the press; if not needed immediately, an LGV takes it to the storage area. When the press computer calls for a reel, an LGV takes it to the reel loading area of the presses. It lifts the reel into the loading position and places it in the correct spot with complete accuracy. As each reel is used up, the press drops the heavy cardboard core ьinto a waste bin. When the bin is full, another LGV collects it and deposits the cores into a shredder for recycling.

F) The LGVs move at walking speed. Should anyone step in front of one or get too close, sensors stop the vehicle until the path is clear. The company has chosen a laser guide function system for the vehicles because, as the project development manager says "The beauty of it is that if you want to change the routes, you can work out a new route on your computer and lay it down for them to follow". When an LGV's batteries run low, it will take itself off line and go to the nearest battery maintenance point for replacement batteries. And all this is achieved with absolute minimum human input and a much reduced risk of injury to people working in the printing centers.

G) The question newspaper workers must now ask, however is, "how long will it be before the robots are writing the newspapers as well as running the printing centre, churning out the latest edition every morning?"

1. Questions 1 – 8.

Complete the flow-chart below. Choose NO MORE THAN THREE WORDS from the text for each answer. Write your answers in boxes 1-8 on your answer sheet.

The production process

The newspaper is compiled at the editorial headquarters by the journalists.

↓

The final version of the text is ____ (1) to the printing center.

↓

The pages arrive by facsimile.

↓

The pages are converted into ____ (2).

↓

____ (3) are made for use in the printing presses.

↓

The LDVs are ____ (4) by computer.

↓

The LDVs collect the reels of paper.

↓

The LDVs remove the ____ (5) from the reel.

↓

The reel is ____ (6).

↓

The reel is trimmed and prepared by the ____ (7).

↓

The reel is taken to the press.	The reel is taken to the ____ (8).

2. Questions 9 – 15.

The text has seven paragraphs A-G. Choose the correct heading for paragraphs A, B and D-G from the list of headings below.

List of Headings

a) Robots working together
b) Preparing LGVs for take-over
c) Looking ahead
d) The LGVs' main functions
e) Split location for newspaper production
f) Newspapers superseded by technology
g) Getting the newspaper to the printing centre
h) Controlling the robots
i) Beware of robots!

9) Paragraph A
10) Paragraph B
Example
11) Paragraph C i)
12) Paragraph D
13) Paragraph E
14) Paragraph F
15) Paragraph G

Text 3

Robots

Since the dawn of human ingenuity, people have devised ever more cunning tools to cope with work that is dangerous, boring, onerous, or just plain nasty. That compulsion has culminated in robotics - the science of conferring various human capabilities on machines

A) The modern world is increasingly populated by quasi-intelligent gizmos whose presence we barely notice but whose creeping ubiquity has removed much human drudgery. Our factories hum to the rhythm of robot assembly arms. Our banking is done at automated teller terminals that thank us with rote politeness for the transaction. Our subway trains are controlled by tireless robo-drivers. Our mine shafts are dug by automated moles, and our nuclear accidents - such as those at Three Mile Island and Chernobyl - are cleaned up by robotic muckers fit to withstand radiation. Such is the scope of uses envisioned by Karel Capek, the Czech playwright who coined the term 'robot' in 1920 (the word 'robota' means 'forced labor' in Czech). As progress accelerates, the experimental becomes the exploitable at record pace.

B) Other innovations promise to extend the abilities of human operators. Thanks to the incessant miniaturization of electronics and micromechanics, there are already robot systems that can perform some kinds of brain and bone surgery with sub millimeter accuracy - far greater precision than highly skilled physicians can achieve with their hands alone. At the same time, techniques of long-distance control will keep people even farther from hazard. In 1994 a ten- foot-tall NASA robotic explorer called Dante, with video-camera eyes and with spider-like legs, scrambled over the menacing rim of an Alaskan volcano while technicians 2,000 miles away in California watched the scene by satellite and controlled Dante's descent.

C) But if robots are to reach the next stage of labor-saving utility, they will have to operate with less human supervision and be able to make at least a few decisions for themselves - goals that pose a formidable challenge. 'While we know how to tell a robot to handle a specific error,' says one expert, 'we can't yet give a robot enough common sense to reliably interact with a dynamic world.' Indeed the quest for true artificial intelligence (Al) has produced very mixed results. Despite a spasm of initial optimism in the 1960-s and 1970-s, when it appeared that transistor circuits and microprocessors might be able to perform in the same way as the human brain by the 21st century, researchers lately have extended their forecasts by decades if not centuries.

D) What they found, in attempting to model thought, is that the human brain's roughly one hundred billion neurons are much more talented - and human perception far more complicated - than previously imagined. They have built robots that can recognize the misalignment of a machine panel by a fraction of a millimeter in a controlled factory environment. But the human mind can glimpse a rapidly changing scene and immediately disregard the 98 per cent that is irrelevant, instantaneously focusing on the woodchuck at the side of a winding forest road or the single suspicious face in a tumultuous crowd. The most advanced computer systems on Earth can't approach that kind of ability, and neuroscientists still don't know quite how we do it.

E) Nonetheless, as information theorists, neuroscientists, and computer experts pool their talents, they are finding ways to get some life like intelligence from robots. One method renounces the linear, logical structure of conventional electronic circuits in favor of the messy, ad hoc arrangement of a real brain's neurons. These 'neural networks' do not have to be programmed. They can 'teach' themselves by a system of feedback signals that reinforce electrical pathways that produced correct responses and, conversely, wipe out connections that produced errors. Eventually, the net wires itself into a system that can pronounce certain words or distinguish certain shapes.

F) In other areas researchers are struggling to fashion a more natural relationship between people and robots in the expectation that someday machines will take on some tasks now done by humans in, say, nursing homes. This is particularly important in Japan, where the percentage of elderly citizens is rapidly increasing. So experiments at the Science University of Tokyo have created a 'face robot' - a life-size, soft plastic model of a female head with a video camera imbedded in the left eye - as a prototype. The researchers' goal is to create robots that people feel comfortable around. They are concentrating on the face because they believe facial expressions are the most important way to transfer emotional messages. We read those messages by interpreting expressions to decide whether a person is happy, frightened, angry, or nervous. Thus the Japanese robot is designed to detect emotions in the person it is 'looking at' by sensing changes in the spatial arrangement of the person's eyes, nose, eyebrows, and mouth. It compares those configurations with a database of standard facial expressions and guesses the emotion. The robot then uses an ensemble of tiny pressure pads to adjust its plastic face into an appropriate emotional response.

G) Other labs are taking a different approach, one that doesn't try to mimic human intelligence or emotions. Just as computer design has moved away from one central mainframe in favour of myriad individual workstations - and single processors have been replaced by arrays of smaller units that break a big problem into parts that are solved simultaneously - many experts are now investigating whether swarms of semi-smart robots can generate a collective intelligence that is greater than the sum of its parts. That's what beehives and ant colonies do, and several teams are betting that legions of mini-critters working together like an ant colony could be sent to explore the climate of planets or to inspect pipes in dangerous industrial situations.

1. Questions 1-6.

Reading passage has seven paragraphs A-G. From the list of headings below choose the most suitable heading for each paragraph. Write the appropriate numbers (a-j) in boxes 1-6.

a) Some success has resulted from observing how the brain functions
b) Are we expecting too much from one robot?
c) Scientists are examining the humanistic possibilities
d) There are judgments that robots cannot make
e) Has the power of robots become too great?
f) Human skills have been heightened with the help of robotics
g) There are some things we prefer the brain to control
h) Robots have quietly infiltrated our lives
i) Original predictions have been revised
j) Another approach meets the same result

1) Paragraph A
2) Paragraph B
3) Paragraph C
4) Paragraph D
5) Paragraph E

6) Paragraph F

Example

Paragraph G b)

2. Questions 7 -11.

Do the following statements agree with the information given in reading passage? Write –

YES if the statement agrees with the information

NO if the statement contradicts the information

NOT GIVEN if there is no information on this in the passage

7) Karel Capek successfully predicted our current uses for robots

8) Lives were saved by the NASA robot, Dante

9) Robots are able to make fine visual judgments

10) The internal workings of the brain can be replicated by robots

11) The Japanese have the most advanced robot systems

3. Questions 12-27.

Complete the summary below with words taken from paragraph F. Use NO MORE THAN THREE WORDS for each answer.

The prototype of the Japanese ‘face robot’ observes humans through a ____ (12) which is planted in its head. It then refers to a ____ (13) of typical ‘looks’ that the human face can have, to decide what emotion the person is feeling. To respond to this expression, the robot alters it’s own expression using a number of ____ (14).

Text 4

Robotic approach to crop breeding

Jennifer Manyweathers takes a look at a robot that is being used to identify drought-tolerant crop varieties

A) The Australian sunflower industry is the major source of polyunsaturated fatty acids found in margarines and spreads. Recognized as the type of fatty acid most able to protect against heart disease, it is in everybody's best interest that Australia has a competitive and healthy sunflower industry, but in Australia, there is a constant struggle with the harsh climate. However, thanks to one special robot, farmers may be able to win the battle against drought.

B) Dr Chris Lambrides, a research fellow at the University of Queensland, is nearing the end of a project that aims to develop more drought tolerant sunflowers by selecting flowers that use water more efficiently. He's done this with the help of a robot developed by the Australian National University's Research School of Biological Sciences.

C) Plants undergo photosynthesis to produce energy in the form of sugar. This involves allowing carbon dioxide to enter the leaves through pores called stomata. Transpiration is the mechanism by which plants lose water through their leaves. This system is thought to facilitate the passage of minerals through the plant and is vital for healthy plants.

D) However, in conditions of drought, the plants that can use the available water efficiently and lose less to the environment will be more likely to thrive and, in a commercial sense become more profitable. These plants are classified as having high transpiration efficiency. When plants transpire, the leaves become cooler due to evaporation. Therefore, by measuring the temperature of the leaves, scientists can determine how much water is being lost through transpiration.

E) When the project first began the researchers used hand-held infrared thermometers to measure the temperature difference between leaves of different varieties of sunflowers in an experimental plot. Wind can affect leaf temperature, and the research team discovered that its initial approach did not cater for changes in wind speed, which could not be controlled as an experimental variable. The team, therefore, needed a technique to measure temperature continuously that would allow it to examine the effects of other variables such as humidity. They needed a robot.

F) They designed a robot with two infrared thermometers set at 1800 to each other. The robot runs on an oblong track around the experimental plot and the thermometers operate on each side of the track. In order to minimize any variables from the two thermometers, they are rotated 1800 at the beginning of each run and the results are averaged. The infrared thermometers can be rotated on an angle to examine different parts of the foliage.

G) The robot is also able to detect light intensity. It has a garage on the track, where it waits until the light intensity is high enough to give useful results. If the skies darken due to rain, heavy cloud cover or sunset, the robot makes its way back to the garage to wait.

H) The main difficulty faced by the research group was to find an agronomist who could grow the perfect crop of sunflowers. The sunflower canopy had to be complete, with no visible soil, 50 that the thermometers would only measure the temperature of the plants and not the surrounding environment. Eight varieties of sunflower were examined. The data collected by the robot has been used by the research team to determine which variety has the highest transpiration efficiency.

I) This is not the first time such methods have been used to determine drought-resistance in plants. The team and their robot have already made a major breakthrough in the Australian wheat industry with Drysdale Wheat, which signaled the arrival of a new technique for selecting drought-resistant species.

1. Questions 1-4.

Complete the sentences with words taken from the passage. Use *NO MORE THAN TWO WORDS* for each answer.

1 In terms of our health, sunflowers are important in defending humans against ____

2 The research team wanted to find a sunflower that could cope well in conditions ____

3 The name of the process which is believed to help keep plants in good condition is ____

4 The research team had to rethink their initial approach when they realized they needed to measure the impact of external conditions such as ____ and ____

2. Questions 5-12.

The reading passage has nine paragraphs labeled A-I. Which paragraph contains the following information?

5) the precise growing conditions required to allow the experiment to work

6) a description of the how the robot operates

7) an explanation of two important processes used by plants

8) a reference to a previous study using a different crop

9 details of what the robot does when conditions are poor

10) the name of the group responsible for making the robot

11) the number of different types of sunflower tested

12) the purpose of taking the temperature of the plants

Text 5

Dawn of the robots

They're already here - driving cars, vacuuming carpets and feeding hospital patients. They may not be walking, talking, human-like sentient beings, but they are clever... and a little creepy.

A) At first sight it looked like a typical suburban road accident. A Land Rover approached a Chevy Tahoe estate car that had stopped at a kerb; the Land Rover pulled out and tried to pass the Tahoe just as it started off again. There was a crack of fenders and the sound of paintwork being scraped, the kind of minor mishap that occurs on roads thousands of times every day. Normally drivers get out, gesticulate, exchange insurance details and then drive off. But not on this occasion. No one got out of the cars for the simple reason that they had no humans inside them; the Tahoe and Land Rover were being controlled by computers competing in November's DARPA (the U.S. Defense Advanced Research Projects Agency) Urban Challenge.

B) The idea that machines could perform to such standards is startling. Driving is a complex task that takes humans a long time to perfect. Yet here, each car had its on-board computer loaded with a digital map and route plans, and was instructed to negotiate busy roads; differentiate between pedestrians and stationary objects; determine whether other vehicles were parked or moving off; and handle various parking manoeuvres, which robots turn out to be unexpectedly adept at. Even more striking was the fact that the collision between the robot Land Rover, built by researchers at the Massachusetts Institute of Technology, and the Tahoe, fitted out by Cornell University Artificial Intelligence (AI) experts, was the only scrape in the entire competition. Yet only three years earlier, at DARPA's previous driverless car race, every robot competitor - directed to navigate across a stretch of open desert - either crashed or seized up before getting near the finishing line.

C) It is a remarkable transition that has clear implications for the car of the future. More importantly, it demonstrates how robotics sciences and Artificial Intelligence have progressed in the past few years - a point stressed by Bill Gates, the Microsoft boss who is a convert to these causes. 'The robotics industry is developing in much the same way the computer business did 30 years ago,' he argues. As he points out, electronics companies make toys that mimic pets and children with increasing sophistication. T can envision a future in which robotic devices will become a nearly ubiquitous part of our day-to-day lives,' says Gates. ”We may be on the verge of a new era, when PC will get up off the desktop and allow us to see, hear touch and manipulate objects in places where we are not physically present.”

D) What is the potential for robots and computers in the near future? The fact is we still have a way to go before real robots catch up with their science fiction counterparts/ Gates says. So what are the stumbling blocks? One key difficulty is getting robots to know their place. This has nothing to do with class or etiquette, but concerns the simple issue of positioning. Humans orient themselves with other objects in a room very easily. Robots find the task almost impossible. 'Even something as simple as telling the difference between an open door and a window can be tricky for a robot,' says Gates. This has, until recently, reduced robots to fairly static and cumbersome roles.

E) For a long time, researchers tried to get round the problem by attempting to re-create the visual processing that goes on in the human cortex. However, that challenge has proved to be singularly exacting and complex. So scientists have turned to simpler alternatives: 'We have become far more pragmatic in our work,' says Nello Cristianini, Professor of Artificial Intelligence at the University of Bristol in England and associate editor of the Journal of Artificial Intelligence Research. 'We are no longer trying to re-create human functions. Instead, we are looking for simpler solutions with basic electronic sensors, for example. This approach is exemplified by vacuuming robots such as the Electrolux Trilobite. The Trilobite scuttles around homes emitting ultrasound signals to create maps of rooms, which are remembered for future cleaning. Technology like this is now changing the face of robotics, says philosopher Ron Chrisley, director of the Centre for Research in Cognitive Science at the University of Sussex in England.

F) Last year, a new Hong Kong restaurant, Robot Kitchen, opened with a couple of sensor-laden humanoid machines directing customers to their seats. Each possesses a touch-screen on which orders can be keyed in. The robot then returns with the correct dishes. In Japan, University of Tokyo researchers recently unveiled a kitchen 'android' that could wash dishes, pour tea and make a few limited meals. The ultimate aim is to provide robot home helpers for the sick and the elderly, a key concern in a country like Japan where per cent of the population is 65 or older. Over US$1 billion a year is spent on research into robots that will be able to care for the elderly. 'Robots first learn basic competence - how to move around a house without bumping into things. Then we can think about teaching them how to interact with humans,' Chrisley said. Machines such as these take researchers into the field of socialized robotics: how to make robots act in a way that does not scare or offend individuals. 'We need to study how robots should approach people, how they should appear. That is going to be a key area for future research,' adds Chrisles.

1. Questions 1-6.

The text on the following pages has six paragraphs, A-F. Choose the correct heading for each paragraph from the list of headings (a-i) below.

List of Headings

a) Tackling the Issue using a different approach
b) A significant improvement on last time
c) How robots can save human lives
d) Examples of robots at work
e) Not what it seemed to be
f) Why timescales are impossible to predict
g) The reason why robots rarely move
h) Following the pattern of an earlier development
i) The ethical issues of robotics
1) Paragraph A
2) Paragraph B
3) Paragraph C
4) Paragraph D
5) Paragraph E
6) Paragraph F

2. Questions 7- 10.

Look at the following statements (questions 7-10) and the list of people below. Match each statement with the correct person, A, B or C.
NB You may use any letter more than once.

a) Bill Gates
b) Nello Cristianini
c) Ron Chrisley

7) An important concern for scientists is to ensure that robots do not seem frightening

8) We have stopped trying to enable robots to perceive objects as humans do

9) It will take considerable time for modern robots to match the ones we have created in films and books

10) We need to enable robots to move freely before we think about trying to communicate with them

3. Questions 11-26.

Complete the notes below. Choose NO MORE THAN THREE WORDS from the text for each answer.

Robot Features

DARPA race cars: ____ 11 provides maps and plans for route.
Electrolux Trilobite: builds an image of a room by sending out ____ 12.
Robot Kitchen humanoids: have a ____ 13 to take orders.

Text 6

Industrial robots have boosted productivity and growth, but their effect on jobs remains an open question

Robots' capacity for autonomous movement and their ability to perform an expanding set of tasks have captured writers' imaginations for almost a century. Recently, robots have emerged from the pages of science fiction novels into the real world, and discussions of their possible economic effects have become ubiquitous. But a serious problem inhibits these discussions: to date, there has been no systematic empirical analysis of the economic effects that robots are already having.

We find that industrial robots increase labor productivity, total factor productivity and wages. At the same time, while industrial robots have no significant effect on total hours worked (as we explain below), there is some evidence that they reduce the employment of low-skilled workers and, to a lesser extent, middle-skilled workers.

Industrial robots dramatically increase the scope for replacing human labor compared with older types of machines, since they reduce the need for human intervention in automated processes. Typical applications of industrial robots include assembling, dispensing, handling, processing and welding – all of which are prevalent in manufacturing industries – as well as harvesting (in agriculture) and inspecting equipment and structures (common in power plants).

Do the statements below agree with the ideas expressed by the author? Write YES, NO or NOT GIVEN:

1) Science fiction writers are interested in robots for two main reasons
2) Robots are no longer a subject for science fiction
3) Robots are taking over the real world
4) Nobody is discussing the real-world consequences of robots
5) Researchers need to undertake a scientific study of the economic consequences of robots
6) Robots are generally having a positive effect
7) Robots are good for the employment prospects of labourers

8) Older types of machines didn’t replace as many jobs as robots might

9) Handling, processing and welding will no longer be necessary in the future in the manufacturing industry

10) Harvesting can’t currently be handled by robots

Text 7

Toddlers Bond with Robot

A) Will the robot revolution begin in nursery school? Researchers introduced a state-of-the-art social robot into a classroom of 18- to 24-month-olds for five months as a way of studying human-robot interactions. The children not only came to accept the robot, but treated it as they would a human buddy - hugging it and helping it - a new study says. "The results imply that current robot technology is surprisingly close to achieving autonomous bonding and socialization with human toddlers," said Fumihide Tanaka, a researcher at the University of California, San Diego

B) The development of robots that interact socially with people has been difficult to achieve, experts say, partly because such interactions are hard to study. "To my knowledge, this is the first long-term study of this sort," said Ronald Arkin, a roboticist at the Georgia Institute of Technology, who was not involved with the study. "It is groundbreaking and helps to forward human-robot interaction studies significantly," he said.

C) The most successful robots so far have been storytellers, but they have only been able to hold human interest for a limited time. For the new study, researchers introduced a toddler-size humanoid robot into a classroom at a UCSD childhood education center. Initially the researchers wanted to use a 22-inch-tall model, but later they decided to use another robot of the QRIO series, the 23-inch-tall (58-centimeter-tall) machine was originally developed by Sony. Children of toddler age were chosen because they have no preconceived notions of robots, said Tanaka, the lead researcher, who also works for Sony. The researchers sent instructions about every two minutes to the robot to do things like giggle, dance, sit down, or walk in a certain direction. The 45 sessions were videotaped, and interactions between toddlers and the robot were later analyzed.

D) The results showed that the quality of those interactions improved steadily over 27 sessions. The tots began to increasingly interact with the robot and treat it more like a peer than an object during the first 11 sessions. The level of social activity increased dramatically when researchers added a new behavior to QRIO's repertoire: If a child touched the humanoid on its head, it would make a giggling noise. The interactions deteriorated quickly over the next 15 sessions, when the robot was reprogrammed to behave in a more limited, predictable manner. Finally, the human-robot relations improved in the last three sessions, after the robot had been reprogrammed to display its full range of behaviors. "Initially the children treated the robot very differently than the way they treated each other," Tanaka said. "But by the end they treated the robot as a peer rather than a toy."

E) Early in the study some children cried when QRIO fell. But a month into the study, the toddlers helped QRIO stand up by pushing its back or pulling its hands. “The most important aspect of interaction was touch”, Tanaka said. “At first the toddlers would touch the robot on its face, but later on they would touch only on its hands and arms, like they would with other humans”. Another robot like toy named Robby, which resembled QRIO but did not move, was used as a control toy in the study. While hugging of QRIO increased, hugging of Robby decreased throughout the study. Furthermore, when QRIO laid down on the floor as its batteries ran down, a toddler would put a blanket over his silver-colored "friend" and say "night-night."

F) "Our work suggests that touch integrated on the time-scale of a few minutes is a surprisingly effective index of social connectedness," Tanaka says. "Something akin to this index may be used by the human brain to evaluate its own sense of social well-being." He adds that social robots like QRIO could greatly enrich classrooms and assist teachers in early learning programs. Hiroshi Ishiguro - robotics expert at Osaka University in Japan - says, "I think this study has clearly reported the possibilities of small, almost autonomous humanoid robots for toddlers. Nowadays robots can perform a variety of functions that were thought to be incident to people only - in short time we’ll have electronic baby-sitters and peer-robots in every kindergarten," said Ishiguro, who was not involved with the study but has collaborated with its authors on other projects.

G) Now this study has taken a new direction - the researchers are now developing autonomous robots for the toddler classroom. "I cannot avoid underlining how great potential it could have in educational settings assisting teachers and enriching the classroom environment," Tanaka said. However, some scientists don’t share his opinion.

H) Arkin, the Georgia Tech roboticist, said he was not surprised by the affection showed by the toddlers toward the robot. "Humans have a tremendous propensity to bond with artifacts with any or all sort, whether it be a car, a doll, or a robot," he said. But he also cautioned that researchers don't yet understand the consequences of increased human-robot interaction. "Just studying how robots and humans work together can give us insight into whether this is a good thing or a bad thing for society," Akrin said. "What are the consequences of introducing a robot artifact into a cadre of children? How will that enhance, or potentially interfere with, their social development? It might make life easier for the teacher, but we really don't understand the long-term impact of having a robot as a childhood friend, do we?"

1. Questions 1-7.

Reading Passage 3 has eight paragraphs, A-H. Which paragraph contains the following information? Write the correct letter, A-H. You may use any letter more than once.

1) Changes in toddler-robot interactions quality

2) Comparison of two different robots

3) The fact that previous robots could maintain people's interest only for a short time

4) The importance of touch

5) The new direction of the study

6)Technical parameters of the introduced robot

7) The significance and novelty of the conducted study.

2. Questions 8-12.

Connect each of the statements below with the name of scientist who expressed it. Answer a, b, or c to questions 8-12.

a) Fumihide Tanaka

b) Ronald Arkin

c) Hiroshi Ishiguro

8) Robots will perform duties of baby-sitters in the nearest future

9) By the end of the study children treated the robot as a living creature rather than a toy

10) The long-term impact of having a robot as a childhood friend can be negative

11) The conducted study is the first major study of this sort

12) Robots can be used in classrooms and assist teachers

3. Questions 13-15.

Choose the correct letter, A, B, C or D. Write the correct letter in boxes 13-15.

13) For the study, researchers introduced a toddler-size humanoid robot that was:

a) 58-inch-tall

b) 22-inch-tall

c) 23-inch-tall

d) 45-inch-tall

14) The researchers sent instructions to the robot to perform different actions EXCEPT:

a) laugh

b) dance

c) sit down

d) crawl

15) The toddlers began to increasingly interact with the robot during:

a) the first 11 sessions

b) the next 15 sessions

c) the first 27 sessions

d) the last 15 sessions

Text 8

Robots with a sense of self

At Yale University, scientists have created a humanoid robot named Nico. When Nico sits in front of a mirror and raises an arm, he recognizes the arm moving in the mirror as his own. It may not sound like much of a feat, but he has just become the fi rst of his kind to recognize his own reflection in a mirror.

The ability to recognize your reflection is considered an important milestone in infant development and as a mark of self-awareness, sociability and intelligence in a non-human animal. Nico's ability to perform the same feat could pave the way for more sophisticated robots that can recognize their own bodies even if they are damaged or reconfigured.

The achievement is one of a cluster of recent instances in which robots have begun to approach the major milestones in cognitive development. If robots can be taught to move from one developmental stage to the next, as infants do, they may eventually be capable of learning more complicated tasks and therefore become more useful to humans. 'It's less about recreating a human than making a human compatible being,' says Matt Berlin, a robotics researcher at Massachusetts Institute of Technology.

To give Nico the ability to recognize himself, Kevin Gold and his supervisor Brian Scassellati equipped Nico with a video camera behind one of his eyes. They also gave him a jointed arm with an attached computer running some clever software. When Nico points his camera eye at the mirror, the software assigns sections of the image a probability of being 'self ', 'another' or 'neither'. At the same time, motion sensors in Nico's arm tell the software when he is moving. Whenever a section of the image changes at the same time as his motion sensors detect movement in the arm, he assigns that section a high probability of being 'self '. If a section of the image shifts and Nico detects no movement in his arm, he assigns that image section a high probability of being 'another', while static sections are likely to be 'neither'. This allows him to recognize not only his own moving limbs, but those of other robots or people.

To test the self-recognition software, Gold programmed Nico to move his arm for four minutes while filming it with his camera, allowing him to learn when movement of his arm, detected by his arm sensors, corresponded to motion of the arm in the video. Nico was then positioned so that he could see both his own reflection in a mirror and Gold standing beside it. Gold carried out a range of different tasks, including juggling balls, while Nico moved his arm around. Nico's software was able to correctly classify the movements corresponding to his own reflection and those of Gold 95% of the time.

The same system should also make it possible for robots to recognize their own limbs even if they are damaged, or wearing different clothes by correlating movement detected by on-board cameras with those reported by sensors on their limbs, says Gold. This should help them carry out tasks such as manipulating objects or let them adapt the way they walk to a changing terrain, when conventional vision software can be fooled by changes in appearance or environment.

The ability to tell self from other should also allow robots to carry out more sophisticated tasks, says Olaf Sporns, a cognitive scientist and roboticist at Indiana University in Bloomington. For instance, researchers are investigating imitation as a way of helping robots learn how to carry out tasks. To successfully and safely imitate someone, though, robots will need to distinguish between their own limbs and those of another person, as Nico can 'The distinction between self and other is a fundamental problem for humanoid robotics,' says Sporns.

Meanwhile, a furry robot called Leonardo, built at MIT recently, reached another developmental milestone, the ability to grasp that someone else might believe something you know to be untrue. You can test the capacity for 'false belief ' in children by showing them a scene in which a child puts chocolate in a drawer and goes away. While he is out of sight, his mother moves the chocolate somewhere else. Young children are incapable of seeing the world through the other child's eyes, and so predict that he will look for the chocolate in the place his mother has left it. Only when they reach four or five can they predict that the other child will mistakenly look for the chocolate in the drawer.

Leonardo, developed by Cynthia Breazeal together with Berlin and colleague Jesse Gray, uses face, image and voice recognition software running on an array of attached computers to build a 'brain' for himself – basically a list of objects around him in the room and events that he has witnessed. Whenever he spots a new face, he builds and stores another 'brain' which processes information in the same way as his own but sees the world from the new person's point of view.

When faced with the false-belief test, Leonardo knows that the object has been moved and also that a person who left the room before this would not know this. It is more than just a cute trick, however. Gray found that the ability to model other people's beliefs allows Leonardo to gain a better understanding of their goals.

As well as helping to build better robots, such research could ultimately enhance our understanding of cognitive development in infants. Developmental milestones such as self-recognition and modeling other people's beliefs are believed to be associated with the development of other important capabilities, such as empathy and sociability. By performing feats associated with these milestones, such robots could help researchers understand what capabilities infants need to reach them, says Sporns. 'It shows us that complex phenomena can sometimes be explained on the basis of simple mechanisms.

1. Questions 1–4.

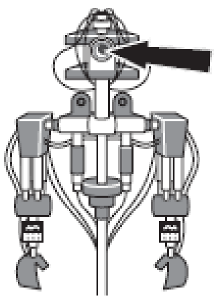
Look at the following people (questions 1–4) and the list of statements below. Match each person with the correct statement, A–E:

1) Matt Berlin
2) Kevin Gold
3) Olaf Sporns
4) Jesse Gray

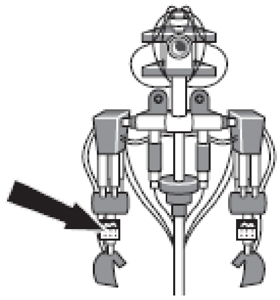
a) suggests that robots cannot yet discriminate between themselves and others
b) thinks that research using robots can help us understand the skills young children need to develop
c) wants robots to be able to respond to varying conditions
d) is working on a number of different versions of a robot
e) is not trying to make a human being but a machine to help humans

2. Questions 5–8.

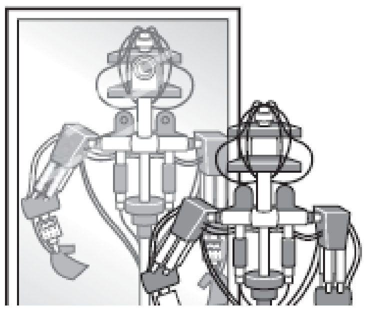
Label the diagrams below. Choose NO MORE THAN TWO WORDS from the passage for each answer.



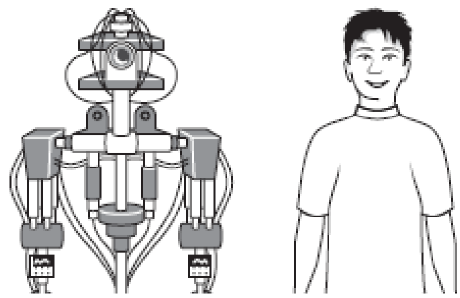
5 .... placed inside robot's 'head'



6 robot's arm fitted with computer software and ....



7 robot films own .... movement



8 researcher performs separate actions, e.g. ....

3.) Questions 9–13.

Complete the sentences below. Choose NO MORE THAN TWO WORDS from the passage for each answer.

9) Nico has reached a significant developmental stage by identifying a ____ as his own

10) Nico classifies what he sees as being '____' if he detects no movement on the image or his sensors

11) Researchers are developing robots that can recognize broken____ belonging to them

12) Researchers investigate ____ among youngsters using chocolate

13) Robotic research can help us learn about children’s ____

Text 9

Artificial Intelligence

It is becoming acceptable again to talk of computers performing human tasks such as problem-solving and pattern-recognition.

A) After years in the wilderness, the term 'artificial intelligence' (AI) seems poised to make a comeback. AI was big in the 1980-s but vanished in the 1990-s. It re-entered public consciousness with the release of Al, a movie about a robot boy. This has ignited a public debate about AI, but the term is also being used once more within the computer industry. Researchers, executives and marketing people are now using the expression without irony or inverted commas. And it is not always hype. The term is being applied, with some justification, to products that depend on technology that was originally developed by AI researchers. Admittedly, the rehabilitation of the term has a long way to go, and some firms still prefer to avoid using it. But the fact that others are starting to use it again suggests that AI has moved on from being seen as an over-ambitious and under-achieving field of research.

B) The field was launched, and the term 'artificial intelligence' coined, at a conference in 1956 by a group of researchers that included Marvin Minsky, John McCarthy, Herbert Simon and Alan Newell, all of whom went on to become leading figures in the field. The expression provided an attractive but informative name for a research program that encompassed such previously disparate fields as operations research, cybernetics, and logic and computer science. The goal they shared was an attempt to capture or mimic human abilities using machines. That said different groups of researchers attacked different problems, from speech recognition to chess playing, in different ways; AI unified the field in name only. But it was a term that captured the public imagination.

C) Most researchers agree that AI peaked around 1985. A public reared on science-fiction movies and excited by the growing power of computers had high expectations. For years, AI researchers had implied that a breakthrough was just around the corner. Marvin Minsky said in 1967 that within a generation the problem of creating artificial intelligence' would be substantially solved. Prototypes of medical-diagnosis programs and speech recognition software appeared to be making progress. It proved to be a false dawn. Thinking computers and household robots failed to materialize, and a backlash ensued. `There was undue optimism in the early 1980-s; says David Leaky, a researcher at Indiana University. 'Then when people realized these were hard problems, there was retrenchment. By the late 1980-s, the term AI was being avoided by many researchers, who opted instead to align themselves with specific sub-disciplines such as neural networks, agent technology, case-based reasoning, and so on.

D) Ironically, in some ways AI was a victim of its own success. Whenever an apparently mundane problem was solved, such as building a system that could land an aircraft unattended, the problem was deemed not to have been AI in the first plate. 'If it works, it can't be AI; as Dr Leaky characterizes it. The effect of repeatedly moving the goal-posts in this way was that AI came to refer to 'blue-sky' research that was still years away from commercialization. Researchers joked that AI stood for `almost implemented'. Meanwhile, the technologies that made it onto the market, such as speech recognition, language translation and decision-support software, were no longer regarded as AI. Yet all three once fell well within the umbrella of AI research.

E) But the tide may now be turning, according to Dr Leake. HNC Software of San Diego, backed by a government agency, reckons that their new approach to artificial intelligence is the most powerful and promising approach ever discovered. HNC claim that their system, based on a cluster of 30 processors, could be used to spot camouflaged vehicles on a battlefield or extract a voice signal from a noisy background - tasks humans can do well, but computers cannot. 'Whether or not their technology lives up to the claims made for it, the fact that HNC are emphasizing the use of AI is itself an interesting development; says Dr Leaky.

F) Another factor that may boost the prospects for AI in the near future is that investors are now looking for firms using clever technology, rather than just a clever business model, to differentiate themselves. In particular, the problem of information overload, exacerbated by the growth of e-mail and the explosion in the number of web pages, means there are plenty of opportunities for new technologies to help filter and categorize information - classic AI problems. That may mean that more artificial intelligence companies will start to emerge to meet this challenge.

G) The 1969 film, 2001: A Space Odyssey, featured an intelligent computer called HAL 9000. As well as understanding and speaking English, HAL could play chess and even learned to lip read. HAL thus encapsulated the optimism of the 1960-s that intelligent computers would be widespread by 2001. But 2001 has been and gone, and there is still no sign of a HAL-like computer. Individual systems can play chess or transcribe speech, but a general theory of machine intelligence still remains elusive. It may be, however, that the comparison with HAL no longer seems quite so important, and AI can now be judged by what it can do, rather than by how well it matches up to a 30-year-old science-fiction film. 'People are beginning to realize that there are impressive things that these systems can do; says Dr Leake hopefully.

1. Reading Passage has seven paragraphs, A – G. Which paragraph contains the following information? You may use any letter more than once:

1) How AI might have a military impact

2) The fact that AI brings together a range of separate research areas

3) The reason why AI has become a common topic of conversation again

4) How AI could help deal with difficulties related to the amount of information available electronically

5) Where the expression AI was first used

2. Do the following statements agree with the information given in reading passage ?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

6) The researchers who launched the field of AI had worked together on other projects in the past

7) In 1985, AI was at its lowest point

8) Research into agent technology was more costly than research into neural networks

9) Applications of AI have already had a degree of success

10) The problems waiting to be solved by AI have not changed since 1967

11) The film 2001: A Space Odyssey reflected contemporary ideas about the potential of AI computers

3. Choose the correct letter, a), b), c) or d).

12) According to researchers, in the late 1980s, there was a feeling that

a) a general theory of AI would never be developed

b) original expectations of AI may not have been justified

c) a wide range of applications was close to fruition

d) more powerful computers were the key to further progress

13) In Dr Leake's opinion, the reputation of AI suffered as a result of

a) changing perceptions

b) premature implementation

c) poorly planned projects

d) commercial pressures

14) The prospects for AI may benefit from

a) existing AI applications

b) new business models

c) orders from Internet-only companies

d) new investment priorities

Text 10

What is the current state of play in Artificial Intelligence?

A) Can robots advance so far they become the ultimate threat to our existence? Some scientists say no, and dismiss the very idea of Artificial Intelligence. The human brain, they argue, is the most complicated system ever created, and any machine designed to reproduce human thought is bound to fail.

Physicist Roger Penrose of Oxford University and others believe that machines are physically incapable of human thought. Colin McGinn of Rutgers University backs this up when he says that Artificial Intelligence "is like sheep trying to do complicated psychoanalysis. They just don't have the conceptual equipment they need in their limited brains".

B) Artificial Intelligence, or different from most technologies in that scientists still understand very little about how intelligence works. Physicists have a good understanding of Newtonian mechanics and the quantum theory of atoms and molecules, whereas the basic laws of intelligence remain a mystery. But a sizeable number of mathematicians and computer scientists, who are specialists in the area, are optimistic about the possibilities. To them it is only a matter of time before a thinking machine walks out of the laboratory. Over the years, various problems have impeded all efforts to create robots. To attack these difficulties, researchers tried to use the "top-down approach", using a computer in an attempt to program all the essential rules onto a single disc. By inserting this into a machine, it would then become self-aware and attain human-like intelligence.

C) In the 1950s and 1960s great progress was made, but the shortcomings of these prototype robots soon became clear. They were huge and took hours to navigate across a room. Meanwhile, a fruit fly, with a brain containing only a fraction of the computing power, can effortlessly navigate in three dimensions. Our brains, like the fruit flies, unconsciously recognize what we see by performing countless calculations. This unconscious awareness of patterns is exactly what computers are missing. The second problem is robots' lack of common sense. Humans know that water is wet and that mothers are older than their daughters. But there is no mathematics that can express these truths. Children learn the intuitive laws of biology and physics by interacting with the real world. Robots know only what has been programmed into them.

D) Because of the limitations of the top-down approach to Artificial Intelligence, attempts have been made to use a "bottom-up" approach instead-that is, to try to imitate evolution and the way a baby learns. Rodney Brooks was the director of MIT's Artificial Intelligence laboratory, famous for its lumbering "top-down" walking robots. He changed the course of research when he explored the unorthodox idea of tiny "insectoid" robots that learned to walk by bumping into things instead of computing mathematically the precise position of their feet. Today many of the descendants of Brooks' insectoid robots are on Mars gathering data for NASA (The National Aeronautics and Space Administration), running across the dusty landscape of the planet. For all their successes in mimicking the behavior of insects, however, robots using neural networks have performed miserably when their programmers have tried to duplicate in them the behavior of higher organisms such as mammals. MIT's Marvin Minsky summaries the problems of AI: "The history of AI is sort of funny because the first real accomplishments were beautiful things, like a machine that could do well in a math course. But then we started to try to make machines that could answer questions about simple children's stories. There's no machine today that can do that".

E) There are people who believe that eventually there will be a combination between the top-down and bottom-up, which may provide the key to Artificial Intelligence. As adults, we blend the two approaches. It has been suggested that our emotions represent the quality that most distinguishes us as human, that it is impossible for machines ever to have emotions. Computer expert Hans Moravec thinks that in the future robots as fear to protect themselves so that they can signal to humans when their batteries are running low, for example. Emotions are vital in decision-making. People who have suffered a certain kind of brain injury lose the ability to experience emotions and become unable to make decisions. Without emotions to guide them, they debate endlessly over their options. Moravec points out that as robots become more intelligent and are able to make choices; they could likewise become paralyzed with indecision. To aid them, robots of the future might need to have emotions hardwierd into their brains.

F) There is no universal consensus as to whether machines can be conscious, or oven, in human terms, what consciousness means. Minsky suggests the thinking process in our brain is not localized but spread out, with different centers competing with one another at any given time. Consciousness may then be viewed as a sequence of thoughts and images issuing from these different, smaller "minds", each one competing for our attention. Robots might eventually attain a "silicon consciousness". Robots, in fact, might one day embody architecture for thinking and processing information that is different from ours-but also indistinguishable. If that happens, the question of whether they really "understand" becomes largely irrelevant. A robot that has perfect mastery of syntax, for all practical purposes, understands what is being said.

1. Question 1-7.

Reading passage 2 has six paragraphs, A-F. Which paragraph contains the following information? NB you may use any letter more than once.

1) An insect that proves the superiority of natural intelligence over Artificial Intelligence

2) Robots being able to benefit from their mistakes

3) Many researchers not being put off believing that Artificial Intelligence will eventually be developed.

4) An innovative approach that is having limited success

5) The possibility of creating Artificial Intelligence being doubted by some academics

6) No generally accepted agreement of what our brains do

7) Robots not being able to extend their intelligence in the same way as humans

2. Questions 8-10.

Look at the following people (questions 8-10) and the list of statement below. Match each person with the correct statement, A-E.

8) Colin McGinn

9) Marvin Minsky.

10) Hans Moravec

a) artificial Intelligence may require something equivalent to feelings in order to succeed

b) different kinds of people use different parts of the brain

c) tests involving fiction have defeated Artificial Intelligence so far

d) people have intellectual capacities which do not exist in computers

e) people have no reason to be frightened of robots

3. Question 11 -13.

Complete the summary below. Choose ONE WORD ONLY from the passage for each answer.

When we will have a thinking machine?

Despite some advances, the early robots had certain weaknesses. They were given the information they needed on a ____ (11). This was known as the "top-down" approach and enabled them to do certain tasks but they were unable to recognize ____ (12). Nor did they have any intuition or ability to make decisions based on experience. Rodney Brooks tried a different approach. Robots similar to those invented by Brooks are to be found on ____ (13) where they are collecting information.

Text 11

Biorobotics

Biorobotics is a field within robotic science that is based on the movements of living things. The most famous biorobots look and move a lot like humans. However, there are several robots that have been made to *mimic* animals. While many companies develop such robots as toys, *some* are used for practical purposes. One example of a biorobot is a flying robot that is based on the movements of bees. The robot, named "Carlton," was developed by the German Research Center for Artificial Intelligence. Built to be both light and powerful, it can hover like a bee in tight spaces and also change direction without losing speed. This robot's abilities make it very useful for military and police search and rescue missions. For example, Carlton can hide behind a tall wall, rise up to quickly look at what is on the other side, and then hide again. It can also send video images of what it sees to soldiers in a safe location far away. "Modsnake" is a robot that was modeled on snakes. This robot was developed by the Carnegie Mellon University Biorobotics Lab. It is made to move like a snake, so it can pass through narrow spaces, move over all sorts of obstacles, climb poles, and even swim. The way Modsnake moves makes it useful for a variety of tasks, such as checking for survivors in *collapsed* buildings, finding damaged areas inside of pipes, and cleaning up oil spills in lakes and rivers. A third robot, based on cockroaches, also has several uses. "Sprawl" was designed by a research team at Stanford University to take videos and recover small objects. Like many six-legged robots, Sprawl was made to move like an insect. However, Sprawl is uncommonly fast and strong for its size, just like a real cockroach. These characteristics make it particularly useful for military situations in which an enemy might try to *disable* it. It is very difficult to shoot because it moves quickly and is relatively small. Even if an enemy shoots Sprawl, it can usually keep functioning.

1. What is the passage mainly about?
a) Biorobots based on animals
b) Biorobots that work like humans
c) Military uses of biorobots
d) Flying abilities of biorobots
2. In line 3, the word <u>mimic</u> is closest in meaning to_____.
a) understand
b) guard
c) teach
d) copy
3. In line 3, the word <u>some</u> refers to_____.
a) companies
b) toys
c) rebots
d) humans
4. According to the passage, Carlton can do all of the following things EXCEPT ________.
1) change directions quickly
2) climb in tight spaces
3) hide behind walls
4) send video images
5. What does the author imply about Modsnake?
a) It has no legs
b) It moves quickly
c) It can be dangerous
d) It has no military uses
6. In line 13, the word <u>collapsed</u> is closest in meaning to_____.
a) old
b) cheap
c) wooden
d) fallen
7. Which of the following is true about Sprawl?
a) It was originally built to destroy small objects

b) It was developed by a German research team
c) It is smaller than a cockroach
d) It is small but very solid

8. Why is Sprawl useful in military situations?

a) It cannot be shot
b) It can shoot at the enemy
c) It is small enough to be shot from a gun
d) It will usually keep working even when shot

9. In line 18, the word <u>*disable*</u> *is closest in meaning to_____.*

a) break
b) follow
c) see
d) buy

Text 12

Rise of the robots

Robots came into the world as a literary device whereby the writers and film-makers of the early 20th century could explore their hopes and fears about technology, as the era of the automobile, telephone and airplane picked up its reckless jazz-age speed. From Fritz Lang's "Metropolis" and Isaac Asimov's "I, Robot" to "WALL-E" and the "Terminator" films, and in countless iterations in between, they have succeeded admirably in their task.

Since moving from the page and screen to real life, robots have been a mild disappointment. They do some things that humans cannot do themselves, like exploring Mars, and a host of things people do not much want to do, like dealing with unexploded bombs or vacuuming floors (there are around 10m robot vacuum cleaners wandering the carpets of the world). And they are very useful in bits of manufacturing. But reliable robots—especially ones required to work beyond the safety cages of a factory floor—have proved hard to make, and robots are still pretty stupid. So although they fascinate people, they have not yet made much of a mark on the world.

That seems about to change. The exponential growth in the power of silicon chips, digital sensors and high-bandwidth communications improves robots just as it improves all sorts of other products. And, as our special report this week explains, three other factors are at play.

One is that robotics R&D is getting easier. New shared standards make good ideas easily portable from one robot platform to another. And accumulated know-how means that building such platforms is getting a lot cheaper. A robot like Rethink Robotics's Baxter, with two arms and a remarkably easy, intuitive programming interface, would have been barely conceivable ten years ago. Now you can buy one for $25,000.

C3 IPO

A second factor is investment. The biggest robot news of 2013 was that Google bought eight promising robot startups. Rich and well led (by Andy Rubin, who masterminded the Android operating system) and with access to world-beating expertise in cloud computing and artificial intelligence, both highly relevant, Google's robot programme promises the possibility of something spectacular—though no one outside the company knows what that might be. Amazon, too, is betting on robots, both to automate its warehouses and, more speculatively, to make deliveries by drone. In South Korea and elsewhere companies are moving robot technology to new areas of manufacturing, and eyeing services. Venture capitalists see a much better chance of a profitable exit from a robotics startup than they used to.

The third factor is imagination. In the past few years, clever companies have seen ways to make robots work as grips and gaffers on film sets ("Gravity" could not have been shot without robots moving the cameras and lights) and panel installers at solar-power plants. More people will grasp how a robotic attribute such as high precision or fast reactions or independent locomotion can be integrated into a profitable business; eventually some of them will build mass markets. Aerial robots—drones—may be in the vanguard here. They will let farmers tend their crops in new ways, give citizens, journalists and broadcasters new perspectives on events big and small (see article), monitor traffic and fires, look for infrastructure in need of repair and much more besides.

As consumers and citizens, people will benefit greatly from the rise of the robots. Whether they will as workers is less clear, for the robots' growing competence may make some human labor redundant. Aetheon's Tugs, for instance, which take hospital trolleys where they are needed, are ready to take over much of the work that porters do today. Kiva's warehouse robots make it possible for Amazon to send out more parcels with fewer workers. Driverless cars could displace the millions of people employed behind the wheel today. Just as employment in agriculture, which used to provide almost all the jobs in the pre-modern era, now accounts for only 2% of rich-world employment so jobs in today's manufacturing and services industries may be forced to retreat before the march of the robots. Whether humanity will find new ways of using its labor, or the future will be given over to forced leisure, is a matter of much worried debate among economists. Either way, robots will probably get the credit or blame.

Invisible and otherwise

Robotic prowess will to some extent be taken for granted. It will be in the nature of cars to drive themselves, of floors to be clean and of supplies to move around hospitals and offices; the robotic underpinning of such things will be invisible. But robots will not just animate the inanimate environment. They will inhabit it alongside their masters, fulfilling all sorts of needs. Some, like Baxter, will help make and move things, some will provide care, some just comfort or companionship. A Japanese robot resembling a baby seal, which responds amiably to stroking and can distinguish voices, seems to help elderly patients with dementia.

The more visible robots are, the better they can help humanity discuss questions like those first posed in fiction. Is it necessary that wars always be fought by people who can feel pity and offer clemency, and yet who can also be cruel beyond all tactical requirements? (Already America is arguing about whether drone pilots deserve medals—see article.) Does it matter if the last kindnesses a person feels are from a machine? What dignifies human endeavor if the labour of most, or all, humans becomes surplus to requirements?

People, companies and governments find it hard to discuss the ultimate goals of technological change in the abstract. The great insight of Asimov *et al* was that it is easier to ask such questions when the technology is personified: when you can look it in the face. Like spacefarers gazing back at the home planet, robots can serve not just as workers and partners, but as purveyors of new perspectives—not least when the people looking at them see the robots looking back, as they one day will, with something approaching understanding.

1. What is the primary purpose of the passage?

a) To discuss the future of the robotics industry

b) To present several opinions regarding the future of the robotics industry

c) To present two possible directions for growth in the robotics industry

d) To suggest similarities between the robotics industry and science fiction

e) To summarize several important technological achievements in the robotics industry

2. It can be inferred from the passage that the author would most likely agree that:

a) Robotics today is not strikingly different than robotics was 10 years ago

b) Robots are unlikely ever to perform more than mundane tasks

c) There are at least some robots that perform tasks that are impossible for humans

d) It will take a considerable amount of time and investment before there are any major changes in the robotics industry

e) Robot technology is much farther along today than what would have been expected

3. Each of the following is mentioned in the passage as a reason why the robotics industry is set for major advances EXCEPT:

a) Specialized manufacturing processes are becoming cheaper and more accessible to even smaller robotics companies

b) Technology platforms have become more standardized

c) Greater investment in the robotics industry

d) A greater potential for profit

e) Creative applications of robot technology

4. Which of the following best expresses the main idea of the passage?

a) The robots of Hollywood have inspired a generation of entrepreneurs and scientists driven to bring the fictional robotics of the movies to reality

b) Robots are an essential part of everyday life and will continue improve as they are more accepted outside of factories and in people's homes

c) Although the safety of robots interacting directly with people is a major concern, robots are likely to take on more tasks which will put them in close contact with people

d) Although robot technology has failed to meet expectations, it is likely that in the near future the technology will be greatly improved so that robots will become an ever more integral part of everyday life

e) Still in its infancy, robotics technology has the potential to change the way that we conduct our everyday lives

5. The last line of the passage implies that:

a) At some point in the future robots will perceive the world in an almost identical way to how humans perceive it

b) Robots will be able to communicate many human ideas

c) Robots will be capable of at least some reflection resembling that of humans

d) Because robots will be better able to understand human ideas, there will be a greater trust between robots and humans

e) Humans may be less able to distinguish between roles that are expressly for robots and those that are for humans

6. In the 7th paragraph the author mentions employment in agriculture most likely in order to:

a) provide an example of an industry which benefited greatly from automation

b) suggest that the profit of industry must be balanced with the welfare of laborers

c) question whether improving the efficiency of a vital industry is always beneficial to society

d) provide an example for the argument made in the preceding paragraph

e) provide a possibly analogous situation to what could happen to employment in industries in which humans can be replaced with robots

Keys:
Text 1
A brief history of automata
1) myths
2) levels
3) tools
4) F
5) E
6) B
7) D
8) A
9) palace
10) trades
11) water
12) techniques
13) children
Text 2
Robots at work
1) transmitted (electronically)
2) (photographic) film/negative(s)
3) (aluminium) printing plates
4) programmed
5) damaged paper/wrapping
6) weighed
7) paster robot(s)
8) storage area
9) e
10) g
11) i
12) d
13) a
14) h
15) c
Text 3
Robots
1) h
2) f
3) i
4) d
5) e
6) c
7)YES

8) NOT GIVEN
9) YES
10) NO
11) NOT GIVEN
12) video camera
13) Database

Text 4

Robotic approach to crop breeding

1) heart disease
2) drought
3) transpiration
4) wind
5) H
6) F
7) C
8) I
9) G
10) B
11) H
12) D

Text 5

Dawn of the robots

1)V
2)II
3) VIII
4) VII
5) I
6) IV
7) C
8) B
9) A
10) C
11) onboard computer
12) ultra sound signal
13) touch screen

Text 6

Industrial robots have boosted productivity and growth, but their effect on jobs remains an open question

1) Y
2) NG
3) NG
4) N
5) N

6) NG
7) N
8) Y
9) N
10) N

Text 7

Toddlers Bond with Robot

1) D
2) E
3) C
4) E
5) G
6) C
7) B
8) C
9) A
10) B
11) B
12)A
13) C
14) D
15) A

Text 8

Robots with a sense of self

1) e
2) c
3) a
4) b
5) video camera
6) motion sensors
7) arm
8) juggling (balls)
9) reflection/(arm) movement
10) neither
11) limbs (not arms)
12) false believe
13) cognitive development

Text 9

Artificial Intelligence

1) E
2) B
3) A
4) F

5) B
6) NOT GIVEN
7) FALSE
8) NOT GIVEN
9) TRUE
10) FALSE
11) TRUE
12) B
13) A
14) D

Text 10

What is the current state of play in Artificial Intelligence?

1) c
2) d
3) b
4) d
5) a
6) f
7) c
8) d
9) c
10) a
11) disc
12) patterns
13) Mars

Text 11

Biorobotics

1) D
2) C
3) B
4) A
5) D
6) D
7) D
8) A

Text 12

Rise of the robots

1) a
2) c
3) a
4) d
5) c
6) e

Additional plan 2018. pos.21

Luara Sergeyeva

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