

## TEST Z JEZYKA ANGIELSKIEGO DLA KANDYDATÓW DO SZKOŁY DOKTORSKIEJ BIOMEDCHEM UŁ 2023

### ***I. Listen to the lecture about an experiment and decide if the statements are True or False. (20 points)***

- 1) The pitch drop experiment has been going on since 1927. [True]
- 2) There were no physics professors at the University of Queensland before Thomas Parnell. [True]
- 3) Professor Parnell wanted to show that common substances can have extraordinary properties. [True]
- 4) Pitch is a substance that looks liquid at room temperature. [False]
- 5) The sample of pitch used in 1927 was analysed instantly. [False]
- 6) Professor Parnell had died before the pitch started dripping. [True]
- 7) Professor Mainstone was in charge of the pitch experiment from 1961. [True]
- 8) In the year 2000, the pitch drop was not filmed due to electricity failure. [True]
- 9) The live web stream of the experiment is not available yet. [False]
- 10) They have just moved the pitch experiment to Dublin. [False]

### ***II. Listen to five people talking about therapies and treatments they have tried. Match speakers to the treatments. (10 points)***

- Speaker 1    aromatherapy  
Speaker 2    social prescribing  
Speaker 3    counselling  
Speaker 4    acupuncture  
Speaker 5    gardening

*(Adapted from English File, fourth edition, OUP)*

### ***III. Read the following extract and do the exercises:***

#### Researchers reveal mechanism of protection against breast and ovarian cancer

In a new paper published in Nature, researchers at the Francis Crick Institute outlined the structure and function of a protein complex that is required to repair damaged DNA and protect against cancer.

Every time a cell replicates, mistakes can happen in the form of mutations, but specialized proteins exist to repair the damaged DNA. People with mutations in a DNA repair protein called BRCA2 are predisposed to breast, ovarian, and prostate cancers which often develop at a young age. In the clinic, these cancers are treated with a drug that inhibits PARP, another protein needed for DNA repair.

Recent work shows that defects in several other proteins can cause hereditary breast and ovarian cancers or Fanconi anemia, a blood disorder that can lead to different cancers, including leukemia. The researchers used cryo-electron microscopy to reveal the atomic structure of four of these proteins, which come together to form a complex called BCDX2. This allowed them to map mutations associated with cancer on the 3D structure,

revealing the important regions of the complex and why certain mutations prevent DNA repair, leading to an instability in a person's genes and cancer.

In addition, the researchers discovered BCDX2's role in the cell, finding that it acts as a 'molecular chaperone' - it helps target another protein called RAD51, causing it to recognize and assemble at regions where DNA repair needs to take place. Together, BRCA2, BCDX2, and RAD51 are the main players in the process that repairs damaged DNA called 'homologous recombination'. The research shows that BCDX2 is just as important for repairing DNA as BRCA2, suggesting that mutations should also be routinely screened for.

Luke Greenhough, co-first author and postdoctoral research assistant at the Crick, said: "For the first time, we've been able to show the direct links between structure, function, and why mutations in any of the components of BCDX2 lead to cancer. We now understand its crucial role in DNA repair, which explains why mutations can lead to cancer."

Eric Liang, co-first author and postdoctoral fellow at the Crick, said: "Just five years ago, we wouldn't have been able to do this, but the rapid advance of technology has made this research possible. DeepMind's AlphaFold2 (a computer program that can predict a protein's 3D structure), cryo-EM, and high-resolution imaging techniques allowed us to gather the full picture of the structure and function of this key protein complex. It was a very collaborative project, spanning multiple labs and technical teams across the Crick."

Steve West, group leader of the DNA Recombination and Repair Laboratory at the Crick, said: "BRCA2 is well characterized and known to increase the risk of cancer, especially breast and ovarian cancers. It's mutated in 15-20% of inheritable cancer cases, so it is regularly screened for. "Our research has shown that BCDX2 is also crucial for DNA repair and acts in the same pathway as BRCA2. For people with cancers caused by defects in BCDX2, PARP inhibitors are also likely to be effective. Our findings suggest that people with a family history of these cancers should be screened for mutations in the proteins making up BCDX2 to get a full picture of their risk."

The researchers are now hoping to shed light on another protein complex, CX3, which is also involved in cancer. Putting all these insights together will allow a better understanding of genes that put people at a greater risk of cancer and help with targeted treatment.

*(Adapted from Science Daily, an online magazine)*

**a) Decide whether the following statements are True or False. (10 points)**

1. Mutations in BRCA2 can bring about different kinds of cancer. [True]
2. PARP is a drug that repairs DNA. [False]
3. BCDX2 is a complex made up of proteins whose atomic structure is known. [False]
4. Thanks to cryo-electron microscopy, the researchers observed three-dimensional proteins. [False]
5. RAD51 helps BCDX2 to gather in places where DNA repair is needed. [False]
6. According to Greenhough, the research clarifies the process of cancer formation. [True]
7. Had it been for the technology available today, the research wouldn't have been possible. [True]
8. The research involved scientists from different institutes. [False]
9. BRCA2 is responsible for 15-20% of all cancers. [False]
10. Work on CX3 has already commenced. [False]

**b) For each word or phrase below, find a synonym in the text as in the example. Write ONE word in each space. (20 points)**

0. explained in general terms - outlined
1. susceptible, inclined to have - [predisposed]
2. prevents, slows down - [inhibits]
3. a problem, an illness - [disorder]
4. unsteadiness, lack of balance - [instability]
5. come together - [assemble|gather]
6. happening repeatedly, frequently - [routinely]
7. vital, essential – [crucial]
8. fast or sudden - [rapid]
9. done by two or more people or groups working together - [collaborative]
10. passed on from generation to generation - [inheritable|hereditary]

**IV. Fill in the gaps with the words listed below. There is one word you will not need. Put it in the space provided. (6 points)**

**FURTHER AIM DEAL FORMULATE AMASS MEANS**

A scientist is a professional who conducts and gathers research to **(1)** [further] knowledge in a particular area. Scientists may make hypotheses, test them through various **(2)** [means] such as statistics and data, and **(3)** [formulate] conclusions based on the evidence. There are several types of scientists and nearly every industry requires the knowledge and research performed by these professionals.

Scientists **(4)** [aim] to find measurable data through various analysis and testing methods. The most commonly used method in science is the scientific method. This procedure is used to **(5)** [amass] measurable evidence based on a hypothesis.

Unnecessary word: **(6)** [deal]

*(Adapted from: <https://www.indeed.com/career-advice/career-development/what-is-a-scientist>)*

**V a. Language elements – choose the correct option. (10 points)**

**1) [b] of his experience, he didn't get the job.**

- a) Despite
- b) In spite
- c) Although
- d) Even though

**2) She is the woman [c] daughter was awarded the prize.**

- a) who
- b) whom
- c) whose
- d) that

**3) If only we [a] ruined it yesterday.**

- a) hadn't
- b) haven't
- c) aren't
- d) didn't

**4) [a] can take part in the event. It is free of charge.**

- a) Anybody
- b) Nobody
- c) Something
- d) Nothing

**5) A lot of research [d] done recently.**

- a) are
- b) were
- c) have been
- d) has been

**6) Nobody admitted [b] the computer.**

- a) to steal
- b) having stolen
- c) being stolen
- d) to be stolen

**7) It will take him a long time to get used [b] abroad.**

- a) to work
- b) to working
- c) work
- d) working

**8) What is it? It feels [a] paper.**

- a) like
- b) as if
- c) as though
- d) –

**9) There might [d] an explosion.**

- a) being
- b) to be
- c) has been
- d) have been

10) If she had prepared for the exam thoroughly, she [c] passed it.

- a) will have
- b) will be
- c) would have
- d) might be

**Vb. Wordformation. Complete each sentence with the correct word derived from the words in capitals. (9 points)**

1. Successful [applicants] must be able to demonstrate a clear ability to lead. **APPLY**
2. I've always been fiercely [independent], confident and determined to succeed. **DEPEND**
3. Some common reasons for [dismissal] include poor performance or incompetence. **DISMISS**
4. The law applies to all gases; hydrogen is no [exception]. **EXCEPT**
5. There is [incredibly] tough competition for MIT candidates. **CREDIBLE**
6. What is the difference between osmosis and [diffusion]? **DIFFUSE**
7. There are concerns that the factory's waste is [detrimental] to the environment. **DETRIMENT**
8. Capillaries are delicate and easily [breakable]. **BREAK**
9. Facial reconstruction plays an important role in the [identification] of missing people. **IDENTIFY**

**VI. Complete the letter by choosing the correct word or phrase. (15 points)**

Dear Dr. Lohani,

I am writing **(1) with applying / to apply** [to apply] for the tenure-track faculty position in Embedded Systems currently **(2) posted / posting** [posted] with the department of electrical and computer engineering. Given that Queen's University has identified my research area as a strategic priority **(3) for / with** [for] growth in the faculty, I believe that my skills and experience present an excellent fit for this position.

My research interests include the design and implementation of communication algorithms for wired and wireless optical channels. My Ph.D. thesis extends **(4) currently / current** [current] modem design techniques to the case of wireless optical channels. Although detection is done in electrical domain on these channels, the optical domain **(5) imposes / impositis** [imposes] constraints on the class of signals which can be transmitted. My thesis presents a signal space model **(6) so as / to** [to] represent modulation schemes and defines lattice codes for optical intensity channels under a variety **(7) in / of** [of] constraints. Capacity bounds are also **(8) derived / deriving** [derived] for the channel and the role of modulation in achieving high-spectral efficiencies is formally described.

My thesis **(9) also / both** [also] presents results of some experimental work on the design of a pixelated transmitter/imaging receiver wireless optical link. Channel measurements are made to justify a channel model and some candidate spatial modulation schemes are proposed and tested. This multiple — input/multiple-output (MIMO) channel offers significant gains in spectral **(10) interest / efficiency** [efficiency] for future wireless optical links. In addition **(11) to / with** [to] my academic research, in my professional experience I have worked in private industry. This is of benefit to your department in **(12) conclusion / view** [view] of your close ties with the private as well as the public sector.

My teaching experience includes teaching a variety of class sizes (from 40 to 225 students), supervising labs and coordinating other teaching assistants. I supervised 8 undergraduate students in their major research projects, under the direction of the course instructor. Through this experience, I have developed excellent communication, problem-solving, and organizational skills. My skills **(13) in / at** [in] teaching would be beneficial, as Queen's University Department of Electrical and Computer Engineering continues its expected growth, with the development of new programs at the undergraduate and graduate level.

Please find **(14) enclosed / attachment** [enclosed] my curriculum vitae, a list of references, a statement of teaching, and a statement of research. Please contact me if there are any further questions regarding my application.

**(15) Yours sincerely / Fond regarding** [Yours sincerely],

*Menar Omat*

Department of Electrical and Computer Engineering, University of Toronto

*(Adapted from 'Creating Your Cover Letter for Academic Positions', University of Toronto)*