VARC

Read the passage below and answer the questions that follow:

Physics is in crisis. For the past century or so, we have explained the universe with two wildly successful physical theories: general relativity and quantum mechanics. Quantum mechanics describes how things work in the incredibly tiny world of particles and particle interactions. General relativity describes the big picture of gravity and how objects move. Physicists want to produce a theory of "quantum gravity" that replaces general relativity and quantum mechanics, while capturing the extraordinary success of both.

One of the most prominent mathematical approaches to quantum gravity is loop quantum gravity, which proposes that the fabric of space and time is made of a network of extremely small discrete chunks, or 'loops.' A remarkable aspect of loop quantum gravity is that it appears to eliminate time entirely. A number of other approaches also seem to remove time as a fundamental aspect of reality.

So, we know we need a new physical theory to explain the universe, and that this theory might not feature time. Suppose such a theory turns out to be correct. Would it follow that time does not exist? It's complicated, and it depends on what we mean by exist. Theories of physics don't include any tables, chairs, or people, and yet we still accept that tables, chairs, and people exist. Why? Because we assume that such things exist at a higher level than the level described by physics. We say that tables, for example, 'emerge' from an underlying physics of particles whizzing around the universe

But while we have a pretty good sense of how a table might be made out of fundamental particles, we have no idea how time might be 'made out of' something more fundamental. So, unless we can come up with a good account of how time emerges, it is not clear we can simply assume time exists. Time might not exist at any level.

Saying that time does not exist at any level is like saying that there are no tables at all. Trying to get by in a world without tables might be tough, but managing in a world without time seems positively disastrous. Our entire lives are built around time. We plan for the future, in light of what we know about the past. We hold people morally accountable for their past actions, with an eye to reprimanding them later on. We believe ourselves to be agents (entities that can do things) in part because we can plan to act in a way that will bring about changes in the future.

The discovery that time does not exist would seem to bring the entire world to a grinding halt. We would have no reason to get out of bed.

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There is a way out of the mess. While physics might eliminate time, it seems to leave causation intact: the sense in which one thing can bring about another. Perhaps what physics is telling us, then, is that causation and not time is the basic feature of our universe. If that's right, then the agency can still survive. For it is possible to reconstruct a sense of agency entirely in causal terms. This suggests that time does not exist and may have no direct impact on our lives, even while it propels physics into a new era.

1. None of the following statements can be inferred from the passage EXCEPT that:
A. Loop quantum gravity theory is the first theory that eliminates time entirely.
B. The theories that reject time as a basic feature of our universe substitute it with causation as a basic feature.
C. Science does not accept that time may have no direct impact on our lives.
D. Physics has established theories that give clarity on how time emerges and exists.

2. 'We say that tables, for example, emerge from an underlying physics of particles whizzing around the universe.' What is the purpose of this example?
A. We can imagine how a table might be made out of more fundamental particles, but we cannot imagine the concept of emergent time.
B. Just like tables, we can explain how time is made out of fundamental particles.
C. The entire underlying physics of particles whizzing around the universe is unscientific.
D. Time and tables are different yet alike in that both 'emerge' from more fundamental particles.

3. Which one of the following sets of words and phrases serves best as keywords of the passage?
A. Loops, time, universe
B. Loops, fundamental, time
C. Emergent time, time and agency, causation
D. Causation, quantum physics, approaches

4. The author makes all of the following arguments in the passage EXCEPT that:
A. According to the loop quantum gravity theory, space and time are made of a network of extremely small discrete loops.
B. Physics in the new era may explain how time may not actually exist.

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C. Some new physical theories to explain the universe do not feature time.

D. What new theories of physics call causation is nothing but another name for time.

5. The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.

1. Researchers worked with 20 patients who were undergoing intracranial recording of brain activity to guide surgery for the treatment of their drug-resistant epilepsy.

2. They looked at how the patients' brain activity was affected when shown film clips containing different types of cognitive boundary transitions thought to trigger changes in how a memory is stored and that mark the beginning and end of memory files in the brain.

3. Researchers have identified two types of cells in our brains that are involved in organizing discrete memories based on when they occurred.

4. This finding improves our understanding of how the human brain forms memories and could have implications for memory disorders such as Alzheimer's disease.

6. There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.

Sentence: Including under-studied populations in genetic resources enhances scientists' ability to discover and precisely map variants that are potentially responsible for health traits and diseases.

Paragraph: Discovering genetic variants that are involved in health-related traits relies on analysing genetic and health information from large cohorts of people. __(1)___. However, there has long been an imbalance of genetic ancestries represented in this kind of research, which has excluded large groups of humanity from the downstream benefits. ___(2)___. Millions of genetic variants differ in frequency around the world owing to complex demographic processes, such as migration, that depend on geographic proximity and shared histories. ___(3)___. Therefore, variants found to be associated with a trait in one population could be less frequent or completely absent in another. ___(4)___.

A. Option 1
B. Option 2
C. Option 3
D. Option 4

7. The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.

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1. UNESCO has had time to plan for the agenda that Guterres wants to implement.
2. The agency must also ensure it can continue to do important work across its three big portfolios: education, science and culture.
3. UNESCO is the main UN agency advocating for open science.
4. It has established guidelines for using artificial intelligence in education.

8. There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.
Sentence: Zinc is light-colored and, as such, reflects a lot of solar energy.
Paragraph: ____(1)____. While zinc does heat up enormously in the sun, it's not a material that's necessarily climate-unfriendly, Ménard says. ____(2)____. With ventilation and proper insulation underneath the sheets, it can be climate-proofed, he says. ____(3)____. However, since adding insulation to zinc roofs often means slightly changing their slopes, some state-appointed heritage architects block requests on the basis that it would alter Parisian aesthetics. ____(4)____. According to some critics, the new UNESCO designation could make such hurdles worse.
A. Option 1
B. Option 2
C. Option 3
D. Option 4

9. Five jumbled-up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.
1. The process of mental health requires its own set of specific skills.
2. People may visualize mental health as a place one arrives at or a treasure one possesses.
3. Life, goes the saying, is like a diamond—hard and beautiful
4. Many are experiencing the hardness of it quite acutely these days, in the form of stress, dread, and fatigue.
5. Much of our success in navigating these difficult times depends on our mental health.

10. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.
As we look to greater distances, we also wind up looking back in time. The nearest galaxy, some 2.5 million light-years away, appears to us as it was 2.5 million years ago, because the light requires that much time to journey to our eyes from when it was emitted. More distant galaxies appear as if they were tens of millions, hundreds of millions or even billions of years ago. As we look ever farther away in space, the light we see from the Universe comes from its progressively younger days.

Therefore, as we look back in terms of distance, we can also measure how the Universe evolved over its history.

A. The light from distant galaxies travels instantaneously, so observing them reveals the present state of the Universe.

B. The nearest galaxies are seen as they are today, while the light from more distant ones is always from their distant future.

C. Looking at galaxies at various distances does not provide any information about the Universe's history or age.

D. Observing distant galaxies allows us to look back in time, as their light shows the Universe's earlier stages and helps us understand its evolution.

DILR

Bluemi is an electronics company operating out of six showrooms S1, S2, S3, S4, S5 and S6. It deals in five major varieties of electronic goods – Mobiles, Tablets, Laptops, Smartwatches and Speakers. The table depicts the sales by showroom (in Rs. Crores).

Showroom	S1	S2	S3	S4	S5	S6
Sales (In Rs. Cr)	27	49	19	31	102	72

The pie chart depicts the category-wise breakdown of sales for Bluemi products.
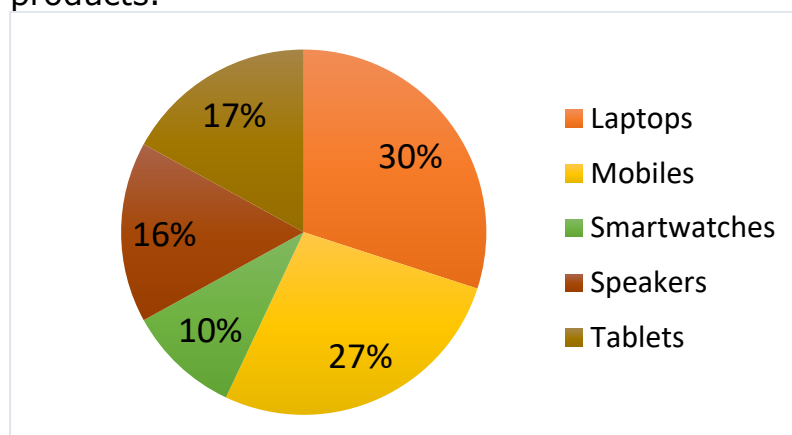
11. If S1, S3 and S5 are the only showrooms dealing in mobiles, and exactly 2 of the 3 dealt only in Mobiles, what approximate % of sales incurred by the other showroom is accounted for by products not in the 'Mobiles' category?
A. 33%
B. 42%
C. 66%
D. 56%

12. If it is known that two particular categories of Bluemi electronic goods are sold in exactly four of the six showrooms, and in those four showrooms, no other category of products is sold, which of the following must be one of those two particular categories?
A. Smartwatches
B. Tablets
C. Speakers
D. Laptops

13. Considering the information provided in question 2, which of the following are not amongst the four showrooms selling those two particular categories exclusively?
A. S1
B. S2
C. S4
D. S6

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14. What is the maximum possible number of categories that can be sold equally across the six showrooms?

The country of Mekrane contains four areas for radar detection: R, S, T, and U. Each detection area is circular and falls completely within Mekrane. Part of R intersects T; part of S also intersects T; R does not intersect S. U is completely within R and also completely within T.
Four planes, J, K, L, M, are over Mekrane, such that each plane is in at least one of the four areas.

- J is in area S.
- K is not in any detection area that J is in.
- L is not in any detection area that M is in.
- M is in exactly one of the areas.

15. If K is within exactly two of the four areas, then which one of the following CANNOT be true?
A. J is within area T.
B. K is within area R.
C. M is within area T.
D. L is within area R.

16. Which one of the following statements CANNOT be true about the planes?
A. M is within area R.
B. K is within area U.
C. M is within area U.
D. L is within area R.

17. If M is within area T, then which one of the following statements CANNOT be true?
A. J is within area T.
B. L is within area R.
C. K is within exactly two areas.
D. L is within exactly two areas.

18. If plane L is within exactly three of the areas, which one of the following could be true?
A. J is within exactly three areas.
B. J is within exactly two areas.
C. K is within area S.
D. M is within area R.

Three different faces of a cube are painted in three different colours — crimson, olive and azure. This cube is then cut into 1331 smaller cubes.

19. What is the maximum number of cubes that have exactly one face painted?
A. 330
B. 319
C. 308
D. 300

20. N denotes the number of small cubes that have one face painted azure and one face painted olive and no other face painted. How many values are possible for N?

QA

21. Tank A consists of chemicals P and Q in the ratio of 4:5 and Tank B consists of chemicals Q and R in the ratio of 3:7. 36 litres of mixture from Tank A is mixed with 40 litres of mixture from Tank B in Tank C . Find the ratio of chemicals Q and R left in Tank C after 38 litres of the mixture is replaced by Chemical R.
A. 3:13
B. 4:13
C. 4:11
D. 3:14

22. Let x,y > 0, if $x^3y^2 = 215$, find the least value of 3x + 2y.
A. 30
B. 32
C. 40
D. 45

23. A boat went down the river for a distance of 20 km. It then turned back and returned to its starting point, having travelled a total of 7 hours. On its return trip, at a distance of 12 km from the starting point, it encountered a log, which had passed the starting point at the moment at which the boat had started downstream. The downstream speed of the boat (in kmph) is

24. An equilateral triangle ABC is inscribed in a circle C1. A smaller circle C2 is inscribed inside the triangle ABC, touching all its three sides. If P is any point on the circumference of the larger circle C1, what is the value of the expression $(PA^2 + PB^2 + PC^2) / r^2$, where r is the radius of the smaller circle C2?
A. 24
B. 18
C. 12
D. 9

25. What is the sum of the smallest three prime factors of $6^{22} - 1$?
A. 31
B. 35
C. 37
D. 41

26. While buying, a shopkeeper uses a faulty balance and receives 1200 grams of tea powder instead of 1000 grams. He gains 'a' percentage profit by selling it at Rs. X per kg. If he sells it for Rs. X + 80 per kg and gains (a + 10)% profit, then find the value of a% of X.
A. 600
B. 700

C. 800

D. Cannot be determined

27. What is the value of $7^{(3 + \log_7 5)}$?

A. 1575

B. 3140

C. 1715

D. 3460

28. Amal, Bimal, and Kamal worked on a project in such a way that Amal and Bimal worked on the 1st day, Bimal and Kamal worked on the 2nd day, Amal and Kamal worked on the 3rd day, and the cycle repeated till the work was completed. When Amal works alone, he can complete the work in 30 days. Bimal is two times as efficient as Amal, while Kamal is 1.5 times as efficient as Amal. What is the percentage of extra time needed if they work in this manner compared to when they work together?

29. A golf ball has a diameter equal to 4.2 cm. Its surface has 200 hemispherical dimples, each of a radius of 2 mm. Calculate the total surface area that is exposed to the surroundings.

A. 74.6 sq cm

B. 77.9 sq cm

C. 85.2 sq cm

D. 80.5 sq cm

30. If the sum of the roots of the given quadratic equation $\frac{1}{x-a} - \frac{1}{x-b} = \frac{1}{c}$ is zero, then find the product of the roots.

A. ab + 2bc

B. bc + 2ac

C. ac + 2bc

D. bc + 2ab

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