NSAT PREP KIT

Newton School of Technology

Objective:

The test is designed to evaluate student's competency in

1. **Structured reasoning & data analysis**
2. **Written communication skills**
3. **Core mathematical concepts**

SECTIONS

Section 1: General Aptitude

Logic & data interpretation - 20 Questions
Algorithmic thinking - 10 Questions

Section 2: English

Reading comprehension - 10 Questions
Language reasoning - 10 Questions

Section 3: Mathematics

10th class maths - 20 Questions
11th & 12th class maths - 10 Questions

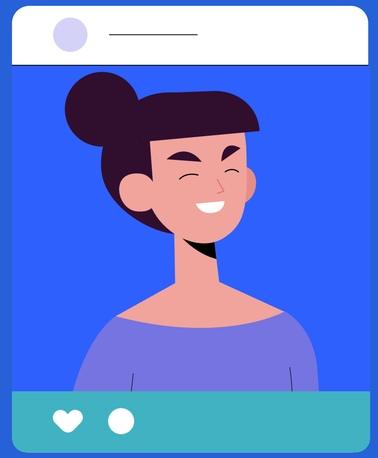
Test Guidelines

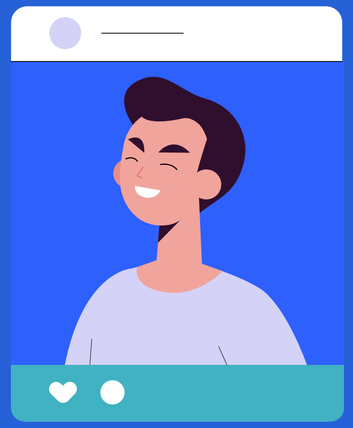
- Multiple choice questions has only one correct answer.
- Select the most accurate and appropriate answer from the given options.
- Marking Scheme: +4 for correct answer, -1 for incorrect answer.
- Students will receive a normalised score in the range of 0-10.
- In any section, students can answer questions in the order they want, i.e. students can go back and forth across questions.

Total Time: 180 Minutes - 80 Questions

TEST TAKING SETUP

The test would be conducted online.
Students can appear for tests virtually from their PC/Laptop on a chrome browser.





Students need to appear for the test from a quiet location without any background noise. The test would be proctored via webcam & microphone.

Recommended Computer configuration: Operating System: **Windows or MacOS**
Browser: **Chrome (updated version)** | RAM: **8 GB or more** | **WebCam & microphone**

GENERAL PREPARATION

Review sample questions to get an understanding of the difficulty level of questions. Test takers don't need to memorise specific facts or proofs for this exam. Just basic familiarity with concepts covered till class 12th Mathematics will be sufficient.

Avoid last minute hassles. Studying a new concept will not add a lot of value as compared to strengthening concepts you already know.
Be calm & confident during the exam, this will result in better performance than any other factor.

SECTION WISE PREPARATION

Section 1 - General Aptitude

This section aims to evaluate student's competency in structured reasoning & data analysis.

Why do we test General Aptitude?

Students having strong competency on general aptitude have higher order reasoning ability and have ability to synthesise information from multiple sources into meaningful insights, which is critical for success in the career of prospective students.

Pre-requisite

Students need to have a good understanding of basic mathematics concepts covered till class 10th. No coding knowledge is required.

Data analysis - analyse & synthesise insights from different type of data sources like:

Tables

Graphs (Line, column, Pie, etc.)

Venn Diagrams

Scatter Plots

Analogical & sequential reasoning - identify patterns from different real world scenarios like:

Arrangement of people & objects
Navigation using directions
Family relations
Encryption-Decryption

Computational Thinking - ability to understand instructions & predict outcomes.

Outcome from specific set of instruction
Instructions required for a specific outcome

Section 2 - English

This section aims to evaluate student's ability to communicate fluently in the English language.

Why do we test English?

Majority of feats in technology & business are achieved through teams. To achieve success in the BTech program as well as your career beyond that, be it a swanky tech job or building your own startup, the ability to communicate your ideas and understand others' ideas is essential to a high functioning team. Additionally in our digital first era, ability to understand and express your voice accurately & effectively can be a game changer for your career trajectory.

Prerequisite

Students should have good command in reading & writing English language. Students will not be tested on their ability to memorise rules of English grammar.

The complexity of texts would be equivalent to prominent news publications and 10th Class English Textbooks.

The texts will be followed up by questions in following formats

Summary, tone & of passage
Supporting & opposing arguments
Error & correct usage identification
Cause & effect relationships
Higher order inferences from texts

Section 3 - Mathematics

This section aims to evaluate student’s competency in core concepts of high school mathematics.

Why do we test General Aptitude?

"Computer science is mathematics in action." - Peter Naur, Turing award winner
The core concepts of mathematics serve as foundation for computer science and AI subjects covered in the BTech program. Subjects like statistics & probability are core of AI & ML.

Upto Class 10th Mathematics

Number system - LCM, HCF, Divisibility, etc.
Arithmetic - Ratios, Averages, Percentages, etc.
Algebra - Polynomials, Inequalities, linear equations, etc.
Applied mathematics - Speed, Profit & loss, Interest, etc

Class 11th & 12th Mathematics:

Sets, Functions, PnC
Sequences & series
Differentiation & integration
Matrices & Determinants
Probability & Statistics

SAMPLE QUESTIONNAIRE

Logic and Data Interpretation

Vishwa, Harleen, Aniket, Rutvik, Vaibhavi & Nishant are studying for their end sem exam in Library. After studying for a few hours, they take a break & play a game where they have to guess their most liked & most disliked food items. Can you guess who loves & hates what based on the hints below?

1. Three people love Pizza.
2. Vaibhavi & Nishant either love or hate Biryani.
3. Only one member hates Pasta.
4. Vishwa hints about two food items, pizza and burger, but doesn't specify which one he likes and which one he hates.
5. Nishant loves paratha, while Rutvik hates pizza.
6. Aniket & Vaibhavi hate Paratha.

Question 1: What does Vishwa love?

Option 1: Burger
Option 2: Pizza
Option 3: Pasta
Option 4: Biryani
Option 5: None of the above

Question 2: For which member are you unable to determine their loved food item?

Option 1: Vishwa
Option 2: Harleen
Option 3: Aniket
Option 4: Rutvik
Option 5: None of the above

Algorithmic thinking

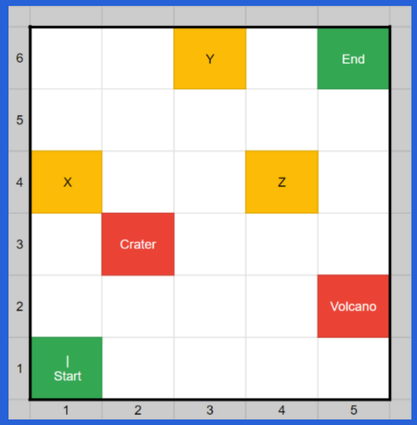
SpaceX is planning their next rover mission to Mars. Below is the miniature map of the landing site. You have to plan the route for the rover from "Start" to "End". Rover can move freely in all blank squares and cannot travel into squares marked as volcano, crater, lake or mountain. Squares marked as X, Y & Z are unknown as of now and can be assumed as blank squares unless specified otherwise. Rover is initially at square "Start", facing the square marked as X. Coordinates of square Y are described as (3,6). Rover understands only these 3 instructions:

> "Move forward"
> "Turn right"
> "Turn left"

Example of route plan with 10 instructions, assuming X, Y & Z are blank:

Start
1. Move forward
2. Move forward
3. Move forward
4. Move forward
5. Move forward
6. Turn right
7. Move forward
8. Move forward
9. Move forward
10. Move forward

End



Question 1:

While the rover is landing, the early spatial scans reveal that square marked as X is an Ammonia lake. In context of this information, which of the below instruction set best describes the new route for the rover to reach from "Start" to "End"?

Option 1

Start
1. Turn right
2. Move forward
3. Move forward
4. Turn left
5. Move forward
6. Move forward
7. Move forward
8. Move forward
9. Move forward
10. Turn right
11. Move forward
12. Move forward
End

Option 2

Start
1. Turn right
2. Move forward
3. Move forward
4. Move forward
5. Move forward
6. Turn left
7. Move forward
8. Move forward
9. Move forward
10. Move forward
11. Move forward

End

Option 3

Start
1. Turn right
2. Move forward
3. Move forward
4. Move forward
5. Turn left
6. Move forward
7. Move forward
8. Move forward
9. Move forward
10. Turn right
11. Move forward
12. Move forward
End

Option 4

Start
1. Turn right
2. Move forward
3. Move forward
4. Turn left
5. Move forward
6. Move forward
7. Move forward
8. Move forward
9. Turn right
10. Move forward
11. Move forward
12. Move forward
End

Option: 5 Non of the above

Question 2:

Due to some malfunction, instead of landing on the "Start" square (1,1) rover accidentally lands on square (1,6) facing the Ammonia lake. Now the rover needs a new set of instructions to reach "End" square. As Mars is far far away from Earth, each instruction that is sent from Ground Station on Earth to the rover on Mars takes around 15 minutes. What is the minimum time in which this communication can be completed?

Option 1: 150 Minutes

Option 2: 135 Minutes

Option 3: 120 Minutes

Option 4: 75 Minutes

Option 5: None of the Above

Reading comprehension

According to psychologist Rachel Herz, disgust is one of our basic emotions - along with joy, surprise, anger, sadness and fear- but it is the only one that we have to learn, and nothing triggers it more reliably than the strange foods of others, especially every culture's favourite fermented food.

Cheese is included in this list. Few varieties look pretty sweaty and slimy. The odour of cheese is repulsive to many. Cheese can actually be described as "the rotted body fluid of ungulate". But Herz says that controlled rot tastes good "in this case". The most important thing is to manage decomposition in such a way that the food has the desired flavour and does not make people sick. In a few cases, decay is necessary as the fresh version is poisonous.

For even an avid cheese lover, eating casu marzu is a challenge. Casu marzu is a sheep cheese popular on the Italian island of Sardinia. Colloquially, it is known as "rotten cheese" or "maggot- ridden cheese" because by the time the fermentation process is over and casu marzu is ready for consumption, it is laden with thousands of maggots.

Natives consider it unsafe to eat casu marzu once the larvae have died, so it is served while translucent white worms, about one-third of an inch long, are still squiggling. Some people take out the maggots from the cheese before eating it, others don't. Those who eat it with maggots may have to cover the cheese with their hands when disturbed, the maggots can jump up to six inches.

Some other favourite fermented foods include kimchi in Korea, which is fermented vegetables (usually cabbage); gravlax, the fermented raw salmon enjoyed in Norway; injera in Ethiopia, a spongy, fermented flatbread; chorizo in Spain, which is fermented and cured uncooked pork sausage; chicha, an Ecuadorian beverage made from chewed corn flour; and the many forms of fermented dairy that are adored and consumed from India to Indiana.
Herz says that it is only natural to feel revolted by some of these descriptions. "The most elemental purpose of the emotion of disgust is to make us avoid rotted and toxic food," she avers. Disgust is not an automatic reaction like fear; it's "an unfolding and cognitive emotion". Food is a marvellous window through which the multifaceted emotion of disgust can be examined. Disgust for a "foreigner" can be easily overcome if he/she eats the right kind of food. Acceptance of food implies acceptance of the larger system of cultural values at hand.

Question 1: Which food is known as "rotten cheese" or "maggot-ridden cheese"?

Option 1: Kimchee

Option 2: Gravlax

Option 3: Chorizo

Option 4: Casu marzu

Option 5: None of the above

Question 2: What is the purpose of the emotion of disgust, according to Rachel Herz?

Option 1: To make us avoid toxic food

Option 2: To enhance our cultural values

Option 3: To trigger fear responses

Option 4: To create joy and surprise

Option 5: None of the above

Language Reasoning

Question 1:

The four sentences (labelled 1, 2, 3, 4) below, when properly sequenced would yield a coherent paragraph. Decide on the best sequencing of the order of the sentences from below options.

1. It was one of the world's first multinational corporations and held a monopoly on trade between the Netherlands and the lucrative markets of Asia.
2. However, factors such as corruption, conflicts with rival colonial powers, and economic decline eventually led to the dissolution of the VOC in 1799.
3. The Dutch East India Company, commonly known as the VOC (Verenigde Oost-Indische Compagnie), was a powerful trading and colonial enterprise established in 1602 by the Dutch Republic.
4. This multinational engaged in activities such as spice trading, shipbuilding, and colonisation, and it wielded significant military and administrative powers in its territories.

Option 1: 1342

Option 2: 3142

Option 3: 4213

Option 4: 1234

Option 5: None of the above

Question 2:

Nuclear energy is a topic that often sparks debates. Nuclear energy is a low-carbon source that doesn't release greenhouse gases during operation. It holds immense potential in mitigating climate change while meeting our increasing energy demands. Nuclear power packs an incredible punch. A small amount of uranium or plutonium can produce a significant amount of energy, making it a highly efficient energy source.

Unlike other renewable energy sources like wind or solar, nuclear power plants can provide a stable and consistent electricity supply. This reliability is crucial for meeting the needs of a modern society. Stringent regulations, advanced designs, and robust containment systems ensure that accidents are highly unlikely and can be mitigated effectively. Through innovative technologies and storage methods, we can safely handle and store radioactive waste, minimising any potential risks to the environment and public health. It's crucial to have open and informed discussions about nuclear energy, weighing its benefits and risks. While it presents challenges, advancements in safety measures and waste management continue to make it a viable option in our diverse energy mix.

Based on the given passage, what beliefs would the author of this text likely hold?

Option 1: The author expresses trust in the stringent safety measures, regulations, and advanced designs in place to ensure the safe operation of nuclear power plants.

Option 2: The author acknowledges gaps in scientific research and technological threats in the fission process, indicating a disbelief in the potential of nuclear energy.

Option 3: The author does not feel safe because of long term effects of nuclear waste, suggesting that even innovative technologies cannot minimize risks to the environment and public health.

Option 4: The author would promote adoption of nuclear energy across countries irrespective of safety laws and waste management processes.

Option 5: None of the above

Upto 10th Class Mathematics

Question 1:
Gaurav is travelling from Mumbai to Pune on a bullet train. You are provided with the following two statements:

Statement 1. Gaurav's average speed during the trip was higher than 55 metres per second. Statement 2. Gaurav's average speed during the trip was lower than 65 metres per second.

Is Gaurav's average speed during the trip less than 200 kilometres per hour?

Option 1: To answer the above question, each statement is independently sufficient.

Option 2: To answer the above question, both statements are together sufficient, but neither statement is independently sufficient.

Option 3: To answer the above question, both statements are together not sufficient.

Option 4: To answer the above question, statement 1 is independently sufficient but statement 2 is not independently sufficient.

Option 5: To answer the above question, statement 2 is independently sufficient but statement 1 is not independently sufficient.

Upto 10th Class Mathematics

Question 2:

Cinderella bought 63 Disney shares at a price of $12.49 per share and sold them at $100.07 per share after 7 years. She pays a 1.3 percent transaction charge on both purchase & sale of shares. Which of the below options most accurately describes her overall return on investment?

Option 1: 900%

Option 2: 700%

Option 3: 500%

Option 4: 300%

Option 5: None of the above

Class 11th & 12th Mathematics

Question 1:

A bag contains 5 red, 4 blue and 3 green balls. Two balls are drawn at random. What is the probability that they are of different colours?

Option 1: 65%

Option 2: 67%

Option 3: 69%

Option 4: 71%

Option 5: None of the above

Class 11th & 12th Mathematics

Question 2:

Evaluate the integral of f(x).

$$f(x) = \frac{x - 7}{(x + 7)^7}$$

Option 1:

$$f(x) = \frac{1}{6(x + 7)^6}$$

Option 2:

$$-\frac{1}{5}(x+7)^{-5} - \frac{7}{3}(x+7)^{-6} + C$$

Option 3:

$$\frac{7}{3}(x+7)^{-6} - \frac{(x+7)^{-5}}{5} + C$$

Option 4:

$$-\frac{1}{5(x+7)^5} - \frac{7}{3(x+7)^6}$$

Option 5:

None of the above

Wishing you all the best

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